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MATHEMATICS OF FINANCE

By

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PREFACE

To the student of pure mathematics the term *mathematics of finance* often seems somewhat of a misnomer since, in solving the problems usually presented in textbooks under this title, the types of mathematical operations involved are very few and very elementary. Indeed, in a *first course* in the mathematics of finance the development of the most important formulas usually involves no greater difficulties than those encountered in the study of geometric progressions.

Whether it is because of this *seeming* simplicity or because of a tendency to limit the problems to the very simplest kinds, the usual presentation has shown a decided lack of generality and flexibility in many of the formulas and their applications. Since no new mathematical principles are involved, a student who can develop and understand the simpler-appearing formulas should be able to develop easily the more general formulas, which are much more useful. And no student should use important formulas whose derivation and meaning, and hence possibilities and limitations, he does not understand.

There is a marked preference in many places in mathematics for presenting general definitions and formulas first, with the special cases following naturally from them. In trigonometry, for instance, the main importance of the trigonometric functions of an angle is emphasized by presenting first the general definitions of these functions; then the definitions of the functions of an acute angle in terms of the elements of a right triangle follow naturally as special cases. Up to the present time, textbooks in the mathematics of finance have not followed this plan of presentation.

The foregoing considerations, plus years of experience in teaching the subject, sometimes with the more general formulas presented first and sometimes with the limited formulas presented first, have caused the author to feel the need of such a presentation as is attempted here. As everyone in this field of work is aware, the major problem is the thorough understanding of annuities and complete facility in their evaluation. The late Professor Glover, whose valuable and comprehensive tables* for use in problems in the field of finance are well known, often remarked that "few teachers of the subject realize the power and facility to be gained from a thorough appreciation of the double superscript notation in annuity formulas."

The method of presentation emphasizes the point that very few fundamental formulas are necessary for handling financial problems *if these formulas are thoroughly understood and appreciated.* Mathematical forms are of inestimable value, as evidenced by their use in solving ordinary quadratic equations, in performing integration in the calculus, in classifying differential equations for solution, in handling many problems connected with infinite series, and in numerous other places familiar only to the accomplished mathematician. Moreover, these forms, if thoroughly mastered, far from reducing the subject to a mere substituting in formulas, reduce the laborious detail that is necessary without them and bring to the subject much significance and effectiveness otherwise unappreciated. Any method of presentation is likely to involve a choice of forms, and usually it is possible to make choices which will emphasize the fundamentals. It is the author's experience that the method of presentation in this text does contribute to an understanding of these fundamentals.

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* *Tables of Applied Mathematics in Finance, Insurance, and Statistics*, by James W. Glover. George Wahr, Ann Arbor, Michigan.

In Part One of this text two distinct contributions are aimed at: (1) a somewhat different approach to the study of annuities and (2) a presentation of some of the more recent methods in building-and-loan-association practice.

The treatment of annuities is different in two essential respects: (1) the general annuity formulas are presented first, with the so-called simpler annuity formulas following readily as special cases, and (2) the double superscript notation is used in the annuity symbols. The treatment of loans by the direct-reduction plan, which in many places has largely replaced previous methods of building-and-loan-association practice, has been given detailed discussion and illustration.

It is usual in many courses in the mathematics of finance to devote several lessons to a discussion of the simpler forms of life insurance. Part Two of this text is designed to meet this need, without going into theorems on probability and other technical details which are necessary to the student specializing in actuarial theory. Basic principles enabling the student to set up the formulas used in the simpler forms of life insurance follow readily the background furnished in Part One.

The examples and exercises have been solved by the use of tables in which the interest and annuity forms are given to eight decimal places, and their logarithms to seven decimal places. If tables with fewer decimal places are used, there will, of course, be slight variations from the results given in the text.

The author wishes to express his appreciation of the valuable suggestions and criticisms offered by the several members of the staff here at the University of Michigan who have taught the preliminary edition of this text. Mrs. Raiford has given most valuable assistance in reading and checking much of the work done in preparation for publication. In spite of all this help, probably some errors still remain, and to anyone reporting such errors the author will be most grateful.

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FORMULAS

From algebra

1. $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ (from $ax^2 + bx + c = 0$)

2. $S = \frac{n}{2}[2a + (n-1)d]$ *(Arithmetic progression)*

3. $S = \frac{rl - a}{r - 1}$ *(Geometric progression)*

4. $S = \frac{a}{1 - r}$ *(Infinite geometric progression)*

5. $$(a+b)^n = a^n + n \cdot a^{n-1} \cdot b + \frac{n(n-1)}{1 \cdot 2} \cdot a^{n-2} \cdot b^2 + \frac{n(n-1)(n-2)}{1 \cdot 2 \cdot 3} \cdot a^{n-3} \cdot b^3 + \cdots$$ *(Binomial series)*

From the text

	NUMBER	PAGE
6. $I = Prt$	**[3]**	3
7. $A = P(1 + rt)$	**[4]**	3
8. $P = A(1 - dt)$	**[7]**	6
9. $r = \frac{d}{1 - dt}$; $d = \frac{r}{1 + rt}$	**[8]**	7
10. $A = P\left(1 + \frac{j}{m}\right)^{mn}$	**[9]**	15
11. $P = A\left(1 + \frac{j}{m}\right)^{-mn}$	**[10]**	15
12. $\left(1 + \frac{j_1}{m_1}\right)^{m_1} = \left(1 + \frac{j_2}{m_2}\right)^{m_2}$	**[13]**	19
13. $i = \left(1 + \frac{j}{m}\right)^{m} - 1$	**[15]**	19
14. $j = m\left[(1 + i)^{\frac{1}{m}} - 1\right]$	**[16]**	19
15. $A = P\left(1 - \frac{f}{m}\right)^{-mn}$	**[20]**	30

	NUMBER	PAGE
16. $d = 1 - \left(1 - \frac{f}{m}\right)^m$	[21]	31
17. $f = m\left[1 - (1 - d)^{\frac{1}{m}}\right]$	[22]	31
18. $R \cdot {}^{(m)}a^{(p)}_{\overline{n}\vert} = \frac{R}{p} \cdot \frac{1 - (1 + j/m)^{-mn}}{(1 + j/m)^{m/p} - 1} = \frac{R}{m} \cdot a_{\overline{mn}\vert j/m} \cdot s^{(p/m)}_{\overline{1}\vert j/m}$	[24] and [34]	41 and 43
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MATHEMATICS OF FINANCE

PART ONE

Interest and Annuities Certain

CHAPTER I

SIMPLE INTEREST AND SIMPLE DISCOUNT

1. Interest. When we consider problems involving money, the primary consideration in most cases is that of profit. We are accustomed to think of this profit, if it is small as compared with the investment and if it is received at the expiration of a fixed period of time, as *interest.* The original investment is called the *principal,* and the principal plus the interest at any time is called the *amount.*

2. Rate of interest. The significance of interest lies not so much in its amount as in the relation it has to the principal, and in the length of time required for its accumulation. The ratio of interest, earned in one unit of time, to the principal is called the *rate of interest* for that unit of time. Denoting the principal by P, the rate and the amount of interest per unit of time by r and I respectively, we have, by the above definition,

$$r = \frac{I}{P}. \tag{1}$$

If the rate of interest is given without specifying the unit of time, the unit will be understood to be one year.

3. Simple interest. From equation [1] it follows that the total interest per unit of time is given by

$$I = Pr; \tag{2}$$

and if the principal remains at interest for t units of time, then the interest for the complete time is given by

$$I = Prt. \tag{3}$$

Interest computed in this way is called *simple interest.*

If P dollars remain at interest for a time t then the amount A, at the end of this time, is given by

$$A = P + Prt \quad \text{or} \quad A = P(1 + rt). \tag{4}$$

4. Simple interest for fractional parts of a year. Formulas [3] and [4] would seem sufficient to effect the solution of problems involving simple interest. It is worth while, however, to note the variation in the results of a given problem due to the way in which t may be expressed. Consider the following:

Example 1. **On July 20 A loans B $4,000. On February 12 of the following year B wishes to repay the loan, together with interest at 6%. What amount should B pay?**

Solution. The exact time from July 20 to February 12 of the following year, as determined from the table below, is 207 days, whereas counting only 30 days to the month gives only 202 days. Hence, as determined by local usage, **B** may be asked to pay any one of the following amounts:

$$\begin{aligned}
&(a)\ A = 4000(1 + .06 \times \tfrac{207}{360}) = \$4{,}138.00,\\
&(b)\ A = 4000(1 + .06 \times \tfrac{207}{365}) = \$4{,}136.11,\\
&(c)\ A = 4000(1 + .06 \times \tfrac{202}{360}) = \$4{,}134.67,\\
&(d)\ A = 4000(1 + .06 \times \tfrac{202}{365}) = \$4{,}132.82.
\end{aligned}$$

The differences here exhibited depend, of course, upon whether the fractional part of the year is expressed with the exact number of days or with the approximate number (30 days to the month) between the two dates as the numerator, and whether the exact or the approximate number of days in a year is used as the denominator. The four ways in which t can be expressed cause a variation of $5.18 in interest in this problem.

The Number of Each Day of the Year

[For *leap years* the number of the day is *one greater* than the tabular number after February 28]

Day of Mo.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	1	32	60	91	121	152	182	213	244	274	305	335
2	2	33	61	92	122	153	183	214	245	275	306	336
3	3	34	62	93	123	154	184	215	246	276	307	337
4	4	35	63	94	124	155	185	216	247	277	308	338
5	5	36	64	95	125	156	186	217	248	278	309	339
6	6	37	65	96	126	157	187	218	249	279	310	340
7	7	38	66	97	127	158	188	219	250	280	311	341
8	8	39	67	98	128	159	189	220	251	281	312	342
9	9	40	68	99	129	160	190	221	252	282	313	343
10	10	41	69	100	130	161	191	222	253	283	314	344
11	11	42	70	101	131	162	192	223	254	284	315	345
12	12	43	71	102	132	163	193	224	255	285	316	346
13	13	44	72	103	133	164	194	225	256	286	317	347
14	14	45	73	104	134	165	195	226	257	287	318	348
15	15	46	74	105	135	166	196	227	258	288	319	349
16	16	47	75	106	136	167	197	228	259	289	320	350
17	17	48	76	107	137	168	198	229	260	290	321	351
18	18	49	77	108	138	169	199	230	261	291	322	352
19	19	50	78	109	139	170	200	231	262	292	323	353
20	20	51	79	110	140	171	201	232	263	293	324	354
21	21	52	80	111	141	172	202	233	264	294	325	355
22	22	53	81	112	142	173	203	234	265	295	326	356
23	23	54	82	113	143	174	204	235	266	296	327	357
24	24	55	83	114	144	175	205	236	267	297	328	358
25	25	56	84	115	145	176	206	237	268	298	329	359
26	26	57	85	116	146	177	207	238	269	299	330	360
27	27	58	86	117	147	178	208	239	270	300	331	361
28	28	59	87	118	148	179	209	240	271	301	332	362
29	29		88	119	149	180	210	241	272	302	333	363
30	30		89	120	150	181	211	242	273	303	334	364
31	31		90		151		212	243		304		365

In case the time involved is from a given date of one month to the same date of another month, it is customary to express the time as an integral number of months; otherwise the time is expressed by *dividing the exact number of days involved by the approximate number of days in a year,* as in (*a*) above. This latter method gives one form of what is known as *ordinary simple interest,* and *will always be used in this text unless otherwise specified.*

Since in commercial intercourse one finds all kinds of practices in use, it is helpful to remember that the approximate time between two given dates is readily found by the method illustrated in the following example:

Example 2. Determine the approximate number of days between July 18, 1944, and March 7, 1945.

Solution. Write

		Year	Month	Day
March 7, 1945,	as	1944	14	37
July 18, 1944,	as	1944	7	18
Subtracting,			7	19 = 229 days

EXERCISES

1. A loan of \$3,000 was made on March 20 and paid with interest at 5%, by check, on October 3 of the same year. For what amount was the check drawn? *Ans.* \$3,082.08.

2. What principal will amount to \$1,500 in 10 months if invested at 6% simple interest?

3. *Ordinary* and *exact simple interest* are defined by the relations $I_o = P \cdot r \cdot \frac{d}{360}$ and $I_e = P \cdot r \cdot \frac{d}{365}$, respectively, the number of days, *d*, being expressed on the same basis in any given case, i.e., either both exact or both approximate. Show that ordinary simple interest, I_o, is always equal to $\frac{73}{72}$ times I_e.

4. Using the exact number of days for *d*, find the amount by both ordinary and exact interest for an investment of \$1,400 from June 20 to September 5 of the same year, if interest is at 7%.

5. Check the approximate time between July 20 and February 12 of the following year, used in the illustrative Example 1 of Section 4, by the method suggested in Example 2 of Section 4.

6. Using the equation of formula [4], solve for *P*, *r*, and *t* in turn, in terms of the remaining letters.

7. On a cash basis and with money worth 6% simple interest, which of the following offers for a piece of property is the better and by how much? **A**'s offer is \$1,000 cash and an additional \$500 in 6 months; **B**'s offer is \$1,250 cash and an additional \$250 in 12 months. *Ans.* **B**'s offer, by \$.41.

8. On March 13 **A** owed bills amounting to \$4,876.54. Settlement was made on June 8 by making a payment of \$4,914.58. What rate of interest has it cost **A** to leave the bills unpaid for this period?

9. How long will it take for money to double itself if invested at 5% simple interest? How long at 6%? *Ans.* 20 years; $16\frac{2}{3}$ years.

10. A's savings account on January 1 was $4,186.72. On April 1, it amounted to $4,288.59. What average annual rate of interest did **A** make on the investment during this period?

11. On May 10 the sum of $970 was invested at 4%. On what date will the value of the investment be $1,000. *Ans.* Next Feb. 18.

12. **A** has property on which there is a $9,000 mortgage. On this he pays $270 interest each January 20 and July 20. The property is sold to **B** on September 8. **A**'s share of the interest due on the next interest-payment date is deducted from **B**'s purchase price. The agent handling the transaction deducts ordinary interest on the amount of the mortgage from **B**'s bill, but credits **A** with exact interest, pocketing the difference. What is the agent's profit from this source?

5. Simple discount. Frequently, when seeking a loan, one is asked to sign a *noninterest-bearing note* to be paid at some future date. A noninterest-bearing note does not, of course, mean that the borrower receives the use of the loan without interest, but means merely that the face of the note is made for a larger amount than the borrower receives. *Interest paid in advance* in this way is commonly spoken of as *bank discount* or simply as *discount.*

As in the case of interest-bearing notes, the amount of this interest (paid in advance) is taken as a certain per cent of the face (in this case A), and the corresponding rate is called the *rate of discount.* Denoting the rate and the amount of the discount per unit of time as d and D respectively, we have

$$d = \frac{D}{A}. \tag{5}$$

When the unit of time is different from the complete time involved, the total discount is given by the relation

$$D = Adt, \tag{6}$$

and the present value of A, defined by $A - D$, is therefore

$$P = A(1 - dt). \tag{7}$$

Again, as in the case of simple interest, the unit of time is taken as one year, if not otherwise specified, and *ordinary simple discount* means that of the four possible ways of expressing t the choice is made as in ordinary simple interest.

More generally, if the difference between P and A for a unit of time is expressed as a per cent of P, then the corresponding rate is called a rate of interest r; and if this difference is expressed as a per cent of A, then the corresponding rate is called a rate of discount, d. From this last statement it follows that the difference between P and A may be designated either as I or D, as is convenient. Hence, on equating these two values,

$$Prt = Adt,$$

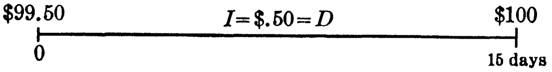
we have, on replacing A by its equal $P(1 + rt)$,

$$Prt = P(1 + rt)dt.$$

$$[8] \qquad \therefore r = \frac{d}{1 - dt}, \quad \text{or} \quad d = \frac{r}{1 + rt}.$$

Example 1. A furniture dealer accepts a \$100 noninterest-bearing note for 15 days in payment for merchandise. To get immediate use of his money, the dealer turns the note over to the bank, which credits him with \$99.50, i.e., charges him 50¢ discount on the note. (*a*) What discount rate is the bank charging? (*b*) What interest rate is being charged?

Solution. The amounts involved in the problem may be pictured thus:



The solutions are readily seen to be

$$(a)\ .50 = 100 \cdot d \cdot \tfrac{15}{360}. \qquad (b)\ .50 = 99.50 \cdot r \cdot \tfrac{1}{24}.$$
$$d = 12.00\%. \qquad r = 12.06\%.$$

Either rate could of course be easily obtained from the other by means of formulas [8]. For instance, $r = \dfrac{.12}{1 - .12 \times \frac{15}{360}} = .1206.$

Throughout this text, unless otherwise specified, the solution for *rates* will always be given to the *nearest hundredth of a per cent.*

NOTE. Since rt and dt are the simple interest and simple discount rates, respectively, where the complete time is taken as the unit of time, we may designate these as r' and d', respectively, and write $A = P(1 + r')$ and $P = A(1 - d')$, from which we have

$$r' = \frac{d'}{1 - d'}, \quad \text{and} \quad d' = \frac{r'}{1 + r'}.$$

If, then, we know either the interest rate or the discount rate for a given period, we can find the corresponding rate for that same period by means of these relations.

Obviously, the solution of the illustrative problem above could have been presented as

$$d' = \frac{.50}{100} = .005, \text{ the rate per period (15 days);}$$

$$\therefore d = 24(.005) = 12\% \text{ per year,}$$

and

$$r' = \frac{.005}{1 - .005} = .005025 \text{ per period (15 days).}$$

$$\therefore r = 24(.005025) = 12.06\% \text{ per year.}$$

An important point to note is that one *could not* find the interest rate per year from the corresponding discount rate per year by assuming that, since each of these is expressed as rates per year, one could find r by using

$$r = \frac{d}{1-d},$$

where $t = 1$. The rate is always a function of the time involved in the transaction.

EXERCISES

1. A note for $800 due in six months, with interest at 5%, was sold to a bank on July 1, 1945. The note was dated March 9, 1945. (*a*) What was the maturity value of the note? (*b*) What did the seller receive if the discount rate was $d = .06$? *Ans.* (*b*) $810.43.

2. Money sufficient to pay bills amounting to $4,650 is borrowed from a loan company which charges 8%, paid in advance. For what amount must a noninterest-bearing note be drawn, payable 90 days from date, to cover the loan?

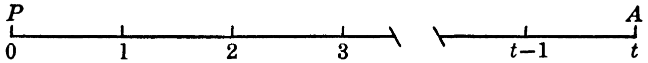
3. What simple interest rate is equivalent to an 8% discount rate in discounting amounts in a transaction involving a period of (*a*) 90 days? (*b*) one year? (*c*) 14 months? *Ans.* (*a*) 8.16%, (*b*) 8.70%, (*c*) 8.82%.

4. Commercial paper due in 60 days, with interest at 5%, is for sale at a discount of 10% of its maturity value. How much must an investor pay per $100 for such paper?

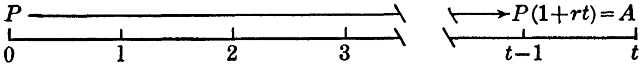
5. A inquires concerning a loan and is told that he can get a cash loan of $98.50 by signing a 60-day noninterest-bearing note for $100, and loans at equivalent discount rates for as long as six months. On this basis, what will be the interest rate per period for a period of 90 days? *Ans.* 2.30%.

6. Use of the terms "interest" and "discount." Confusion often arises in the use of the terms "interest" and "discount." If you should ask your banker what rate of interest is charged on, say, a loan of $100 for 60 days, he would probably reply 6%. When the note was made out, however, you would probably receive $99, to be repaid 60 days later by a payment of $100. The $1 *interest paid in advance* we have thus far considered as discount. Or, again, if you hold a contract calling for annual payments of $1,000 each for the next 5 years, and, needing money, you offer to sell this contract to the bank, you may be offered the value of these annual payments *discounted* at 6%. In this case you would probably discover that the price offered is the *present value* of these payments calculated *at an interest rate* of 6%, compounded annually. It is very necessary, therefore, to understand always precisely what is meant in any given transaction when the terms "interest" and "discount" are used. In this text, when discount in the sense of formulas [5] and [7] is meant, we shall follow the general custom either by using the phrase "interest paid in advance" or by indicating the rate by the letter d; in all other cases the phrase "to discount" shall be understood to mean *to find the present value* at a given interest rate.

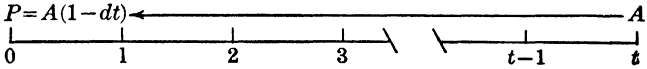
7. Use of a diagram, or time scale. As we proceed further with problems involving either a single sum or several sums we shall find it very helpful to make use of a diagram in the form of a time scale. Let this scale be divided into units corresponding to the unit of time for which the rate of interest (or discount) is given. Indicate the present time on the scale as zero, and the end of the time as t. Since P is the principal at the beginning of the transaction and A is the amount at its completion, we may picture them thus:



Further, since in problems of simple interest A is thought of as derived from P, we may associate a sense of direction with the operation of interest on P to produce A, and represent it by the following diagram:



Similarly, in problems of simple discount, since P is thought of as being derived from A, the sense of direction associated with such problems may be presented thus:



The detail exhibited above is worth while in initiating the useful habit of diagraming a problem so as to visualize more clearly just what is taking place.

EXERCISES

1. The holder of a \$1,000 noninterest-bearing note, due in 3 months, sold it for \$985. He could have borrowed the money needed at an interest rate of 6%. How much more (or less) is this rate than that actually being paid? *Ans.* .09% less.

2. A furniture company receives bills totaling \$11,432.53, which are due in 30 days. If paid within 10 days, the company can settle the entire amount by a payment of \$11,318.20.

a. At what simple interest rate are the bills being discounted?
b. What simple discount rate, d, is the creditor allowing?

3. A accepts a note for \$1,000, due with interest at 5% in 6 months, in payment for services. Four months before the note is due, A needs the cash and sells the note to a bank which pays him \$1,000 for it. (*a*) What interest rate is the bank charging? (*b*) What interest rate paid in advance is being charged? *Ans.* (*a*) .0750, (*b*) .0732.

4. A common phrase occurring on bills is "cash in 30 days or 2% off for cash in 10 days," (i.e., $dt = 2\%$). What is the equivalent rate of interest (per year) being offered for early payment?

5. A $2,500 note bearing interest for one year at 5% is discounted 5 months before it is due at a bank **B** whose discount rate is $d = .06$. What is **B**'s profit if it immediately rediscounts the note at a Federal reserve bank where the rate of discount is $d = .04$? *Ans.* $21.875.

6. A note for $3,000, made for 6 months, bears interest at the rate of 4% per year. The note is bought by a bank 60 days before it is due. If the amount of the discount is $40, (*a*) find correct to four decimal places the simple discount rate d being used, and (*b*) find similarly the simple interest rate which the bank is using.

7. Solve $P = A(1 - dt)$ for A; for d; for t.

8. Show that the difference between *ordinary* and *exact* discount, denoted by D_0 and D_e respectively, is always $\frac{1}{73} D_0$. (See Ex. 3, page 5.)

9. **A** receives a bill for goods amounting to $1,200. The billheads are printed "cash 4, $\frac{2}{10}, \frac{1}{30}, \frac{n}{90}$."* For what amount must a check be drawn to pay the bill (*a*) immediately? (*b*) at the end of 30 days? (*c*) at the end of 90 days? *Ans.* (*a*) $1,152, (*b*) $1,188, (*c*) $1,200.

10. The holder of a $1,000 note due in 3 months sold it for $985. He could have borrowed the money at an interest rate of $6\frac{1}{4}\%$. By selling instead of borrowing, did he gain or lose, and how much?

MISCELLANEOUS EXERCISES

1. A minimum charge of 50 cents is made on discounting commercial paper, i.e., checks, notes, etc. How long before time for payment may a salary check for $100 be cashed in order that this minimum charge shall be exactly equal to 6% discount ($d = .06$)? How long if the check is for $250? *Ans.* 30 days; 12 days.

2. Draw and interpret the graphs for each of the following:

$$(a)\ r = \frac{d}{1 - dt} \text{ for } d = .05$$

$$(b)\ d = \frac{r}{1 + rt} \text{ for } r = .05$$

3. Two offers are made for a piece of property. **A** offers $3,000 cash and $5,000 in 6 months. **B** offers $5,000 cash and $3,000 at the end of one year. On a cash basis and with money worth 5%, which offer is the better, and how much?
Ans. **A**'s, by $20.91.

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* The notation means that the bill will be discounted 4% if paid immediately, 2% if paid within 10 days, 1% if paid after 10 days and not later than 30 days; it must be paid not later than the 90th day, and no discount is allowed after 30 days.

4. A holds a 90-day note for $1,200, bearing interest at 6%, and due November 8, 1945. He decides to hold the note until he can collect $1,200 for it at a bank whose discount rate is $d = .065$. What is the earliest date on which he can accomplish this?

5. If the exact interest on a note is $50.45, find the ordinary interest. *Ans.* $51.15.

6. A buys property by paying $100 at the beginning of each month, with the option of canceling the contract at any time within 2 years and being given back, with interest at 4%, all above $60 per month (charged for rent). At the end of 20 months he finds that he cannot continue the payments and cancels the contract. How much money is due him? (Evaluate as an arithmetic progression.*)

7. The terms of sale on a $300 radio are 10% cash, and the balance, plus 8% of this balance (or a total of $291.60), to be paid in 10 equal monthly instalments. What is the maximum simple discount rate, d, at which the buyer may as well borrow the money and pay cash? (Give the result correct to four significant figures.) *Ans.* 16.16%.

8. On a cash basis, with money evaluated at a simple discount rate of $d = .06$, which of the two offers is the better, and by how much? **A**'s offer is for a cash payment of $1,000 and an additional $500 in 6 months; **B**'s offer is for $1,250 cash and an additional $250 in 12 months.

9. *a.* There are 7 of the 12 months which are 31 days in length. The maximum difference between the exact and the approximate number of days between two dates less than a year apart is therefore 7 days. Show that the maximum difference in interest on p dollars at rate r, as determined by the four methods of Section 4, can be expressed as $Pr \cdot \frac{7}{360} + \frac{1}{73} I_0$.

b. Check the statement given in part *a*, using the data $1,000 invested at 4% from March 10 to the following February 3. *Ans.* $1.27.

10. A bank arranges credit for a merchant to the extent of $24,000. He gives a promissory note to the bank for this amount, to be paid 18 months hence with simple interest at 6%, and the $24,000 is then credited to his account. No interest is allowed by the bank on accounts. If the merchant's account never runs below 20% of the loan, what is the least rate of interest which the merchant can consider he actually pays for the loan?

11. On the day the Outfitting Company failed, it had a mortgage which, if evaluated on that date at 6%, simple interest, was worth $15,380.79. The amount, principal plus interest, payable at maturity was $15,450. How many days before the mortgage was due did the failure of the company take place? *Ans.* 27 days.

12. How long will it take money to treble itself at the following simple interest rates: (*a*) 4%? (*b*) 5%? (*c*) 6%?

13. A trust company offers to loan money at 7% on notes due in 120 days. What rate of discount should the company charge in order that it receive the same return when discounting a loan for 120 days as when making the loan at interest? *Ans.* $d = .0684$.

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*See formula 2, page vii.

14. Make a table like the following, and fill in (*a*) the values of d, given $r = .05$, and, similarly, (*b*) the values of r, given $d = .06$.

r	d	Time Involved in Transaction
		30 days 90 days 1 year 20 months

15. Show by use of the binomial theorem* that, for $t = 1$,

$$(a)\ r = \frac{d}{1-d} = d + d^2 + d^3 + \cdots;$$

$$(b)\ d = \frac{r}{1+r} = r - r^2 + r^3 - \cdots.$$

16. *a.* Using the first three terms of the series of Ex. 15, calculate the corresponding values indicated in the table below.

	r	d		r	d		r	d
a.	.06	--?--	*c.*	.03	--?--	*e.*	--?--	.03
b.	.04	--?--	*d.*	--?--	.05	*f.*	--?--	.02

b. Check the results found in *a* to four decimal places, by using the formulas $r = \frac{d}{1-d}$ and $d = \frac{r}{1+r}$.

17. The average price of an article of equipment for a series of chain stores is $103, with successive cash discounts of 8%, 12%, and 10%. If all the discounts are taken, what price is paid and what is the equivalent single discount rate? *Ans.* $75.05; 27.14%.

18. *a.* What must be the length of time involved in a contract in order that P dollars invested at 5% simple interest accumulate to the same amount as P dollars invested at a simple discount rate of 4%?

b. Check part *a* by taking $P = \$800$ and computing the amounts at the two given rates.

c. Draw on the same axes the graphs of the equations $A = 800(1 + .05\,t)$ and $A = \frac{800}{(1 - .04\,t)}$.

19. A salesman argues that a discount of 2% for payment within 10 days is equivalent to a discount of 72% per year. Is this argument correct, and, if so, why? *Ans.* No.

20. A wishes a loan for 30 days. He holds three notes: (1) a noninterest-bearing note for $500 due in 60 days, (2) a note for $800 due in 90 days without interest, and (3) a note for $1,400 made 2 months ago and due 10 months hence with interest at 5%. The local bank charges 6%, paid in advance, and is willing to make **A** a loan equivalent to the discounted value of these three notes, the three notes being used as collateral. Find (*a*) the amount of cash **A** may obtain, and (*b*) the face of the note to be paid at the end of 30 days.

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*See formula 5, page vii.

21. Show that for a given rate it takes twice as long for money placed at simple interest to treble itself as for it to double itself.

22. A certain 90-day noninterest-bearing note for $1,000 is discounted at a bank **B** whose discount rate is $d = .06$. Bank **B** immediately rediscounts the note at a Federal reserve bank whose rediscount rate is .045. What is **B**'s profit on the transaction?

23. *a*. A bill for $1,450 is received for goods delivered. The terms of payment are 2% off if paid in 10 days, cash in 30 days, and 6% interest for all time over 30 days. If the bill, dated April 26, is paid on the following July 1, find the interest rate corresponding to the amount at time of settlement, and the sum which would have settled the debt in 10 days. *Ans.* 17.06%; $1421.

b. Show that the general expression for the rate on a bill for B dollars, paid d days after date for payment without penalty ($d > 30$), the other conditions of the problem being the same as in *a*, is given by the expression $r = \frac{3}{49}\left(1 + \frac{100}{d + 20}\right)$.

c. More generally, if the terms of a bill are a discount of d' if paid within a time t_1, the face of the bill if paid within a time t_2 following t_1, and interest at a rate r_1 if paid after a time t_3 following t_2, the end of period t_3 being $t = t_1 + t_2 + t_3$ from the date of the bill, then the rate of interest which it has cost the debtor to allow the bill to run for the time t is $r = \frac{d' \cdot t_1 + r_1 \cdot t_3}{(t_2 + t_3)(1 - d' \cdot t_1)}$.

COMPOUND INTEREST AND COMPOUND DISCOUNT

8. Compound interest. If at the end of each unit of time the interest is added to the principal and this amount used as the new principal for the succeeding unit of time, then the total interest earned for a given time is known as *compound interest,* and the total amount is called the *compound amount.*

It may be noted that for a given rate the amount at the end of one unit of time is the same when computed at compound interest as when computed at simple interest.

9. Nominal and effective rates of interest. It is common practice to quote the rate of interest as a given rate per year even though the interest may be payable more often. If an investment of \$1,000 yields \$60 interest in a year, we say that the investment yields 6%. Similarly, if an investment of \$1,000 yields \$60.90 in a year, we say that the yield rate is 6.09%. In the latter case, however, the interest earned has probably been the result of interest having been computed at 3% and added to the principal at the end of each 6 months. In such a case the rate of interest is expressed in either one of two ways, namely, (*a*) as 6.09% *effective* or (*b*) as a *nominal rate* of 6%, *convertible* semiannually. The 6-month interval is called the *conversion period,* the interest being *compounded* twice a year.

10. Notation. The notation adopted at this point is important.

Let $P =$ the principal,

$A =$ the amount to which P accumulates,

$n =$ the total time expressed *in years,*

$j =$ the nominal rate *per year* at which interest is earned during each conversion period,

$m =$ the number of conversion periods *per year,** and hence

$mn =$ the total number of *interest periods,* and

$\frac{j}{m} =$ the rate of interest per conversion period.

$i =$ the rate of interest earned per year, known as the *effective rate* of interest. If $m = 1$, then $j = i$.

For brevity, when $m \neq 1$, we shall often express the nominal rate and the number of conversion periods jointly, thus: for a nominal rate of 6%, convertible quarterly, we shall write $(.06, m = 4)$; if the rate is $j = .04$, compounded semiannually, we write $(.04, m = 2)$; and so on.

If no value is given for m, it is always understood that $m = 1$.

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* This definition of m is interpreted to mean also that each conversion period is of $1/m$ years' duration. Fractional values of m are thus made intelligible. Thus $m = \frac{1}{3}$ means that interest is converted every 3 years.

11. Fundamental relations. From the definition of compound interest it is now possible to set up a general expression for the amount A to which P will accumulate in n years at rate (j, m). The amount at the end of the first conversion period, as given by formula [4], is

$$P\left(1+\frac{j}{m}\right).$$

The interest on this new principal during the second period is

$$P\left(1+\frac{j}{m}\right)\cdot\frac{j}{m},$$

and the amount at the end of the second period is therefore

$$P\left(1+\frac{j}{m}\right)\cdot\frac{j}{m}+P\left(1+\frac{j}{m}\right),$$

which is more conveniently written as

$$P\left(1+\frac{j}{m}\right)^2.$$

Similarly, the amount at the end of the third period is found to be

$$P\left(1+\frac{j}{m}\right)^2\cdot\frac{j}{m}+P\left(1+\frac{j}{m}\right)^2,$$

or

$$P\left(1+\frac{j}{m}\right)^3.$$

Continuing this process, one is led to the conclusion (which is readily proved for positive integral values of n by induction) that the amount at the end of n years is

$$A=P\left(1+\frac{j}{m}\right)^{mn}. \tag{9}$$

Any four of the five quantities used in formula [9] being given, one can, in general, readily solve for the remaining one. Thus the formula may be solved for P and written as

$$P=A\left(1+\frac{j}{m}\right)^{-mn}, \tag{10}$$

which, as we shall see later, is a much more convenient form for use in many problems.

If it happens that the conversion period is one year, and hence j becomes i since $m=1$, then formulas [9] and [10] become, respectively,

$$A=P(1+i)^n, \tag{11}$$

$$P=A(1+i)^{-n}. \tag{12}$$

It is customary to write the *discount factor* $(1+i)^{-1}$ as v. It is usually tabulated as

$$v^n=(1+i)^{-n}.$$

EXERCISES

[If calculating machines are available]

Retain the results of the following exercises for later use.

1. Beginning with $(1+i)^1$ and multiplying successively by $(1+i)$, tabulate $(1+i)^n$ for $i = .03$, and $n = 1, 2, 3, \cdots, 20$. Keep 8 decimal places and check the results with published tables.

2. Evaluate $\frac{1}{1+i}$, i.e., $(1+i)^{-1} = v$, to 8 decimal places, and, multiplying successively by v, tabulate $v^n = (1+i)^{-n}$ for $i = .03$, and $n = 1, 2, 3, \cdots, 20$. Check your results with published tables.

12. Computation of A and P. The method of procedure in computing A or P in a numerical problem depends largely upon what tables or computing devices are available. Values of the *accumulation factor,* $(1+i)^n$, and of the discount factor, $v^n = (1+i)^{-n}$, are tabulated for certain values of i and n.

NOTE. As to the notation of the tables, it is immaterial whether the rate is actually i or $\frac{i}{m}$, and whether the exponent is actually n or mn, as specified in the text, since $(1+i)^n$ and $\left(1+\frac{i}{m}\right)^{mn}$ are both *of the form* $(1+i)^n$, and similarly for $(1+i)^{-n}$ and $\left(1+\frac{i}{m}\right)^{-mn}$.

A presentation of the several methods of evaluation suggests the methods best suited to different types of numerical problems.

Example 1. A trust fund contains \$48,536.30. Find the amount to which the fund will accumulate in 4 years if invested at 4%, compounded semiannually.

Solution. From formula [9] we have

$$A = 48{,}536.30(1.02)^8.$$

If calculating machines are available, one can find the value of $(1.02)^8$ from tables and perform the multiplication directly. Otherwise one would use the following logarithmic solution.*

$$\begin{aligned} \log (1.02)^8 &= .0688014 \\ \underline{\log 48{,}536.30} &= \underline{4.6860667} \\ \log A &= 4.7548681 \\ A &= \$56{,}868.00 \end{aligned}$$

Example 2. A noninterest-bearing note for \$5,000, due in 18 months, is sold to a bank which discounts the note at 6%, compounded quarterly. What are the cash proceeds of the note?

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* With logarithm tables of less than 7 places the number of significant digits retained in the results must be limited accordingly.

Solution. From formula [10] it follows that

$$\begin{aligned} P &= 5000(1.015)^{-6} \\ &= 5000(.91454219) \\ &= \$4{,}572.71. \end{aligned}$$

The calculations here are readily made without the aid of either logarithms or calculating machines.

Example 3. An investment of $10,000 made 6 months ago is credited with $320 interest. If the indicated rate of interest is maintained in the future, and the interest is reinvested along with the principal each 6 months, what will be the value of the investment 5 years from today?

Solution. The rate of interest earned for the first 6 months was 3.2%. The value of the investment 5 years hence will be, therefore,

$$A = 10{,}000(1.032)^{11}.$$

Since the value of $(1 + i)^n$ is not usually tabulated for the rate .032, we may evaluate accurately as follows:

$$\begin{aligned} \log 10000 &= 4.0000000 \\ \underline{11 \log\ 1.032} &= \underline{\ \ .1504767} \\ \log A &= 4.1504767 \\ A &= \$14{,}140.89 \end{aligned}$$

One might expect to find the value of $(1.032)^{11}$ by interpolation between the nearest tabulated values of $(1 + i)^{11}$; but the method of *ordinary straight-line interpolation must be used with caution,* as evidenced by the result obtained when solving the above problem by this method. Presented in detail, we have

	i	$(1+i)^{11}$	
.002	.03	1.38423387	x
.005	.032	- - ? - -	.07573585
	.035	1.45996972	

Since straight-line interpolation assumes that corresponding differences are proportional, we have

$$\begin{aligned} x : .07573585 &= 2 : 5, \\ x &= .03029434. \\ (1.032)^{11} &= 1.38423387 + .03029434 = 1.41452821; \end{aligned}$$

and hence $\qquad A = 10000(1.41452821) = \$14{,}145.28.$

Interpolation in this problem gives a result which is $4.39 too large.

EXERCISES

1. Five hundred dollars was invested at $(.06, m = 2)$ at the time of a child's birth. The child has just reached his sixteenth birthday. What is the value of the account? *Ans.* \$1,287.54.

2. During litigation in court a note which, with interest, amounted $2\frac{1}{2}$ years ago to \$8,375.62, has been left unpaid. The note with interest at 3%, compounded quarterly, is now ordered paid. What sum is required to settle the note?

3. **A** must pay \$6,000 4 years hence, as balance due on a piece of property. A cash payment now, equivalent to the present value of the debt evaluated at $(.07, m = 2)$, is agreed to by both parties concerned. What sum does **A** pay? *Ans.* \$4,556.47.

4. What is the present value of \$4,387.63, due in $3\frac{1}{4}$ years, if money is worth 3%, compounded quarterly?

5. A trust fund of \$5,000 was created on March 15, 1935, which bore interest at 4%, compounded semiannually, until March 15, 1945. Since that time it has earned interest at a rate of $(.03, m = 4)$. What was the value of the fund at the end of March 15, 1946? *Ans.* \$7,655.15.

6. An old account of \$30, made 80 years ago, is paid by an heir. Find the amount of the payment if evaluated at 3%, compounded quarterly. [Express $(1 + i)^{320}$ as $(1 + i)^{200} \cdot (1 + i)^{120}$.]

7. Borrowers from a certain finance company pay \$11.25 per \$1,000 each month as interest. What will be the annual income of such a company from a quarter of a million dollars loaned at this rate, assuming all income to be reinvested immediately? *Ans.* \$35,918.61.

8. Find the present value of \$5,000 due in 8 years at 2%, compounded annually; at 3% compounded annually; at $(.04, m = 1)$; at $(.04, m = 2)$; at $(.06, m = 2)$.

9. Two noninterest-bearing debts, one of \$2,500 due in 3 years, and the other of \$4,000 due in 5 years, are to be paid off immediately. What is the combined cash value of the debts if evaluated at $(.04, m = 2)$? *Ans.* \$5,501.32.

10. **A** must make four monthly payments of \$60 each, the first due one month hence, to complete the payments on a car. If these payments were so calculated as to yield the finance company one half of one per cent per month (i.e., $j = .06, m = 12$), what single cash payment would pay the remaining indebtedness? (*Suggestion:* Do you see any way to combine these present values into a single expression for evaluation?)

11. The rates paid depositors by two neighboring banks are 2%, compounded quarterly, and 3%, compounded semiannually, respectively. **A** has \$5,000 which he will not be using for the next 18 months. The bank paying the smaller nominal rate tells **A** that the fact that it compounds the interest twice as often as the other bank more than offsets the difference in rates. Compute the amounts at the two different rates and thus check up on the statement. *Ans.* \$5,151.89; \$5,228.39.

12. Compare the following amounts at the ends of 0, $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$, 1, 2, 3, 5, and 10 years: \$1,000 at 6% simple interest, and \$1,000 at 6% compound interest. Exhibit the results graphically, measuring the amounts along the vertical axis and time along the horizontal axis.

13. Equivalent interest rates. If the amounts of interest earned in a given period on each of two investments of P dollars are equal, then from the mathematical point of view they are equally desirable. Let (j_1, m_1) and (j_2, m_2) be the two respective investment rates for some period n. Then, since $I = A - P$, we have, on substituting the corresponding values of A and equating,

$$P\left(1+\frac{j_1}{m_1}\right)^{m_1 n} - P = P\left(1+\frac{j_2}{m_2}\right)^{m_2 n} - P,$$

and hence

$$\left(1+\frac{j_1}{m_1}\right)^{m_1} = \left(1+\frac{j_2}{m_2}\right)^{m_2}, \tag{13}$$

which may be written in the form

$$j_1 = m_1\left[\left(1+\frac{j_2}{m_2}\right)^{m_2/m_1} - 1\right]. \tag{14}$$

From the nature of the problem the usual values of m, as is well known, are 1, 2, 4, and 12, so that, in general, formula [14] takes on one of the two very simple forms

$$j = m\,[(1+r)^k - 1]$$

or

$$j = m\,[(1+r)^{\frac{1}{k}} - 1],$$

according as m_2 is greater than or less than m_1.

An important special case of [13] is that in which one of the rates is an effective rate i. If, then, $m_1 = 1$, say, and we write m_2 merely as m, we have $1 + i = \left(1+\frac{j}{m}\right)^m$, which yields the two very useful forms

$$i = \left(1+\frac{j}{m}\right)^m - 1, \tag{15}$$

$$j = m[(1+i)^{\frac{1}{m}} - 1]. \tag{16}$$

Formula [15] is readily evaluated from the tables $(1+i)^n$. The form in [16], $m\,[(1+i)^{\frac{1}{m}} - 1]$, is tabulated under a slightly different notation, namely, $j_{(p)} = p\,[(1+i)^{\frac{1}{p}} - 1]$, where the m has been replaced by the letter p. The reason for the notation of the tables will appear later (see pages 39 and 42).

NOTE. The expression for $j_{(p)}$ mentioned above is usually referred to as $j_{(p)}$ at rate i. Although tabulated in this form for only integral values of p, we shall understand the form to define $j_{(p)}$ for all values of p for which p may be replaced by any value p', $0 < p' < 1$, and i be replaced by any value, say j/m.

Example 1. The current rate of interest is $(.04,\ m = 4)$. What is the equivalent nominal rate of interest, compounded monthly?

Solution. By formula [13] we have

$$\left(1 + \frac{j}{12}\right)^{12} = \left(1 + \frac{.04}{4}\right)^{4},$$

which, solved for j, may be written in the form

$$\begin{aligned} j &= 4\{3[(1.01)^{\frac{1}{3}} - 1]\} \\ &= 4(.00996685) \\ &= .03986740,\ m = 12. \end{aligned}$$

In case m_1 is not an exact multiple of m_2, and the numerical reduction by formula [13] does not take on either of the tabulated forms [15] or [16], one may often use the tabulated values of $(1 + i)^{\frac{1}{p}}$ to advantage. More complex forms, which are rare, may have to be evaluated by logarithms or by the binomial theorem.

Example 2. An investor making small loans finds that, on the average, most loans run about 60 days. The investor, ordinarily making $(.06,\ m = 4)$, wishes to know the equivalent rate if the conversion period were made 2 months. Determine this rate.

Solution. Again by formula [13], we find that

$$\left(1 + \frac{j}{6}\right)^{6} = \left(1 + \frac{.06}{4}\right)^{4}.$$

$$\begin{aligned} j &= 6[(1.015)^{\frac{2}{3}} - 1] \\ &= 6[((1.015)^{\frac{1}{3}})^{2} - 1] \\ &= 6[(1.00497521)^{2} - 1] \\ &= .05985104,\quad m = 6. \end{aligned}$$

Problems which reduce to the form of formula [15] present no special difficulties in evaluation.

EXERCISES

Give the solutions for j to as many decimal places as possible when using the form $p[(1 + i)^{\frac{1}{p}} - 1]$.

1. An organization plans all of its investments so as to realize at least 6% effective. (*a*) What is the least rate $(j,\ m = 2)$ which an investment must offer in order to attract the investor? (*b*) What rate $(j,\ m = 4)$? *Ans.* (*a*) .05912603, (*b*) .05869538.

2. A owns bonds which pay dividends of \$30 each 6 months on each \$1,000 of investment. He has an opportunity to exchange the bonds for stock in a finance company which is to use a monthly conversion period in all of its evaluations. What is the minimum nominal rate which the finance company must use in order that the trade be equitable?

3. What is the least rate (j, $m = 2$) a bank may offer prospective customers in order that it be equivalent to the rate of another bank which allows (.03, $m = 4$)? To what effective rate will this be equivalent? *Ans.* .03011250; .03033919.

4. Find the values of j corresponding to the values of m, as indicated in the table below, so that each rate is equivalent to a nominal rate of 5%, compounded quarterly.

m	$\frac{1}{3}$	$\frac{1}{2}$	1	2	4	12	52	365
j	--?--	--?--	--?--	--?--	--?--	--?--	--?--	--?--

5. A certain investment earned (.04, $m = 4$) for a period of 4 years, and 5% effective for the following 8 years. What single rate (j, $m = 2$) over the entire period would have netted the investor the same yield? (*Suggestion:* Evaluate by using a table for $(1 + i)^{\frac{1}{p}}$.) *Ans.* .04632217.

6. (*a*) Expand $(1.03)^5$ to four terms by use of the binomial theorem. (*b*) Make use of the result obtained in (*a*) to find the amount of $800 at the end of 5 years if invested at 3%. (*c*) Check your answer by use of the tables. (*d*) Note that the amount at simple interest for the same period can be found by taking only the first two terms of the binomial expansion. Check this statement.

7. After lengthy litigation in court an insurance company is ordered to pay to a beneficiary the sum of $9,000 plus simple interest at 6%, covering a period of $3\frac{1}{2}$ years. What nominal rate of interest, compounded semiannually, would have resulted in the same interest payment to the beneficiary? *Ans.* .05521.

8. An investment of $1,000 has increased in value $102.50 in 2 years. (*a*) Find the effective rate of increase by expanding $(1 + i)^2$ and solving the resulting quadratic equation for i. (*b*) Check the result found in (*a*) by use of tables.

9. A boy has $300 which he wishes to invest toward providing $500 which he hopes to have 5 years hence. His father agrees to take the money and use it and at the end of the 5 years to pay the boy the full $500 which he desires. What rate of interest (j, $m = 2$) does this cost the father? (*a*) Solve by using the binomial expansion of the accumulation factor and solving the quadratic equation resulting from the omission of all terms in this expansion which contain the rate to the power 3 or higher. (*b*) How much does the result found in (*a*) differ, to four decimal places, from the rate given by interpolation? *Ans.* (*a*) 10.74%, (*b*) +.26%.

14. Fractional conversion periods in compound interest. Thus far we have considered only problems in which interest is added at the end of regular conversion intervals, as provided by our definition of compound interest. The question arises as to how we shall define the values of A and P on a date between two conversion dates. Several methods suggest themselves. We shall consider only two.

When mn is not an integral number, we shall define as the *true compound amount* the value given by $A = P\left(1 + \frac{j}{m}\right)^{mn}$, and as the *true present value* the value P given by $P = A\left(1 + \frac{j}{m}\right)^{-mn}$. The evaluation in either case is often facilitated by the use of the tabulated values of $(1+i)^{\frac{1}{p}}$.

There are approximate methods more often used in practice, and these are the ones which we shall always use in this text, unless otherwise specified, when fractional interest periods are involved in evaluating a single sum. The *approximate amount*, usually called simply the *amount*, and the *approximate present value*, called simply the *present value*, are each combinations of simple and compound interest. They are defined by the following rules:

The approximate amount. *To find the amount when the time involved is not an integral number of conversion periods, accumulate* $\boldsymbol{P}$ *at* $(j, \boldsymbol{m})$ *for the maximum integral number of conversion periods contained in* $\boldsymbol{mn}$*, and the amount thus obtained accumulate at the simple interest rate* j *for the remaining fractional interest period.*

The approximate present value. *To find the present value when the time involved is not an integral number of conversion periods, discount* A *for the minimum integral number of conversion periods,* $\boldsymbol{k}$*, containing the total time* $\boldsymbol{mn}$*, and then accumulate this amount for the time* $\boldsymbol{k} - \boldsymbol{mn}$ *at the simple interest rate* j*.*

If a diagram is made of the problem, marking off the conversion periods by beginning at A, thus making P *fall within* a conversion period, then it is evident that the rule for finding the approximate present value may be stated thus: *Discount* A *to the beginning of the conversion period in which* P *occurs and then accumulate this value at a simple interest rate* j *for the fractional period indicated in the diagram.* (See Example 2, below.)

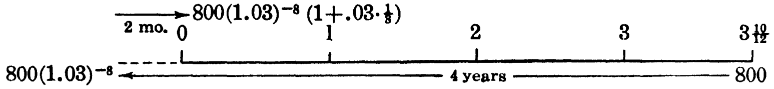
Example 1. Settlement of a debt of \$4,000 contracted 20 months ago and bearing interest at $(.04, m = 4)$ must be made immediately. What sum is required to make the settlement?

Solution. With $m = 4$ and $n = 1\tfrac{8}{12}$ we have $mn = 6\tfrac{2}{3}$, that is, 6 complete interest periods and, in addition, $\tfrac{2}{3}$ of another interest period, for which either simple or compound interest may be computed, as desired. Thus:

True Amount	Amount (Approximate)
$A = 4000(1.01)^{6\frac{2}{3}}$	$A = 4000(1.01)^6(1 + .04 \cdot \frac{2}{12})$
$= 4000(1.01)^6(1.01)^{\frac{2}{3}}$	$= 4000(1.01)^6(1 + .01 \cdot \frac{2}{3})$
	$= 4000(1.01)^6(1.006667)$
$\log 4000 = 3.6020600$	$\log 4000 = 3.6020600$
$\log (1.01)^6 = .0259282$	$\log (1.01)^6 = .0259282$
$2 \log (1.01)^{\frac{1}{3}} = .0028810$	$\log 1.006667 = .0028857$
$\log A = 3.6308692$	$\log A = 3.6308739$
$A = \$4,274.34$	$A = \$4,274.39$

Example 2. A bank buys a noninterest-bearing note drawn for \$800 and due in 3 years and 10 months. What is the price of the note if it is discounted at the rate $(.06, m = 2)$?

Solution. If we express $-mn = -2(3\tfrac{10}{12}) = -7\tfrac{2}{3}$ as $-8 + \tfrac{1}{3}$, we again have expressions for both the true and approximate values that are very much alike. In the notation of the rule given for finding the approximate present value, k is 8 and $k - mn$ is therefore $\tfrac{1}{3}$. We may diagram the problem thus:



True Present Value	Present Value (Approximate)
$P = 800(1.03)^{-7\frac{2}{3}}$ $= 800(1.03)^{-8}(1.03)^{\frac{1}{3}}$ $\log 800 = 2.9030900$ $\log (1.03)^{-8} = 9.8973022 - 10$ $\log (1.03)^{\frac{1}{3}} = .0042791$ $\log P = 2.8046713$ $P = \$637.78$	$P = 800(1.03)^{-8}(1 + .06 \cdot \tfrac{2}{12})$ $= 800(1.03)^{-8}(1 + .03 \cdot \tfrac{1}{3})$ $= 800(1.03)^{-8}(1.01)$ $\log 800 = 2.9030900$ $\log (1.03)^{-8} = 9.8973022 - 10$ $\log (1.01) = .0043214$ $\log P = 2.8047136$ $P = \$637.84$

It is to be noted that in finding both the amount and the present value, if one first sets up the expression for the true value, breaking up the interest factor $\left(1 + \frac{j}{m}\right)^{\pm mn}$ in each case into two factors, one with an integral exponent and one with a *positive* proper fraction as its exponent, say of the form $\frac{q}{p}$, then the factor containing the integral exponent is exactly the same in both the true and the approximate value. Moreover, the fractional exponent in the expression for the true value is changed to a coefficient of $\frac{j}{m}$ to obtain the approximate value; i.e., $\left(1 + \frac{j}{m}\right)^{\frac{q}{p}}$ is replaced by $\left(1 + \frac{j}{m} \cdot \frac{q}{p}\right)$. (This is due to taking the first two terms of the binomial expansion of $\left(1 + \frac{j}{m}\right)^{\frac{q}{p}}$ as its approximate value.) Thus it becomes a very simple matter to write down the expression for the approximate value directly from the expression for the true value by merely shifting the position of an exponent to that of a coefficient. (See Ex. 6, page 21.)

EXERCISES

1. Find both the true and the approximate amount to which \$1,200 will accumulate in 3 years and 10 months if invested at 5%, compounded quarterly. *Ans.* \$1,451.79; \$1,451.82.

2. Find both the true and approximate present value of \$3,000 due 4 years and 5 months hence with interest at $(.04, m = 4)$.

3. The settlement of an insurance claim for \$400,000 was delayed during litigation. After 16 months the claim was paid, with interest at 6%. How much more did the beneficiary receive because the insurance company paid the approximate instead of the true value? *Ans.* \$164.16.

4. A note, together with interest amounting to \$5,237.62, is due in 3 years and 7 months. The holder is willing to discount the note and interest at $(.07, m = 2)$ for immediate settlement. What sum will settle the debt if (*a*) the true present value is paid? (*b*) the approximate present value is paid?

5. Compare graphically, by plotting on the same set of co-ordinate axes, $A = 100(1.04)^n$ and $A = 100(1 + .04 \cdot n)$, for values of n between 0 and 1. Use a fairly large scale, showing the values of n along the horizontal axis and the corresponding values of A along the vertical axis.

6. A boy's guardian receives \$8,000, to be held in trust for the boy until he becomes of age 20 months hence, and deposits this money with a trust company which will allow interest at $(.04, m = 2)$. Find (*a*) the amount which the boy will receive when he becomes of age if simple interest is used for the fractional interest period, and (*b*) the value of the present made the guardian if he is given the excess interest received because simple interest was used for this fractional interest period.

7. A utilities company adds 10% of the face of all regular monthly bills not paid before the 10th of the month. If each month bills totaling \$2,500 are allowed to run over until the 10th of the following month, what is the total profit in a year from this source if money is worth 18%, compounded semiannually, to the company? Assume that interest is computed January 10 and July 10, with simple interest for fractional conversion periods. *Ans.* \$3,252.56.

8. In illustrative Example 2, above, find P from the relation

$$P = 800(1.03)^{-7}(1 - .03 \times \tfrac{2}{3}).$$

Does this expression lend itself to a ready interpretation? If so, give it.

15. Determination of *n* and *j*. It frequently happens that it is necessary to determine n when A, P, m, and j are known, or to find j when A, P, m, and n are given. To find either n or j, the accuracy of the result as obtained by interpolation is, in most cases, quite sufficient, and the computation involved is much simpler than that necessary for finding n and j by other methods. Numerical illustrations are readily followed.

Example 1. Eight years ago an art collector paid \$4,500 for a painting. Today he sold it for \$15,250. What rate $(j, m = 2)$ may he consider that he has made on his investment?

Solution. We have the relation

$$15{,}250 = 4500\left(1 + \frac{j}{2}\right)^{16}.$$

$$\therefore \left(1 + \frac{j}{2}\right)^{16} = 3.3889.$$

The interpolation may be presented in tabulated form as follows:

	$\frac{j}{2}$	$\left(1+\frac{j}{2}\right)^{16}$	
x	.075	3.1808	2081
.005	. . .	3.3889	2451
	.08	3.4259	

Assuming corresponding differences proportional, the value of $\frac{j}{2}$ is $.075+x$, where x is found from the relation

$$x : .005 = 2081 : 2451.$$

$$\therefore \frac{j}{2} = .075 + \frac{2081}{2451} \times .005$$

and

$$j = .1585.$$

NOTE. It can be shown that to use more than four of the eight places of decimals from the tables $(1+i)^{\pm n}$ does not increase the accuracy of the interpolation; hence, we shorten the computation by using only four. If the interest rate is expressed as a decimal, the result by interpolation is, in general, correct to three decimal places, the error in the fourth place being less than $\frac{\Delta}{20}$, Δ being the difference between the interest rates used in the interpolation. In the illustrative example above, the result as obtained by interpolation is, as a matter of fact, in error by only 3 in the fifth decimal place.

Example 2. At the time of the settlement of an estate the sum of \$8,746.32 was left with a trust company for an heir until he should become of age. On that date the heir was paid \$9,753.21. If interest was credited at $(.04,\ m=2)$, how long did the trust company hold the sum on deposit?

Solution. By formula [10] we have the relation

$$8{,}746.32 = 9{,}753.21(1.02)^{-2n}.$$

$$\therefore (1.02)^{-2n} = \frac{8746.32}{9753.21}.$$

$$\begin{aligned}
\log 8746.32 &= 3.9418254\\
\log 9753.21 &= 3.9891476\\
\hline
\log(1.02)^{-2n} &= 9.9526778 - 10\\
2n &= 5 + x\\
n &= 2.75
\end{aligned}$$

	2 n	**log (1.02)$^{-2n}$**	
x	5	9.9570	43
1	. . .	9.9527	86
	6	9.9484	

NOTE. *a.* Although logarithms are used in this solution, the method of the solution is that of interpolation. A logarithmic solution requires the use of formula [17], given on page 26.

b. It can be shown that the value of n obtained by interpolation is the exact value of n if simple interest is used for the fractional interest period involved.

In case more accurate solutions for n and j are desired, we have, from either $A = P\left(1+\frac{j}{m}\right)^{mn}$ or $P = A\left(1+\frac{j}{m}\right)^{-mn}$, the relation

$$\left(1+\frac{j}{m}\right)^{mn} = \frac{A}{P},$$

from which we get, on taking the logarithm of each side,

$$n \cdot \log\left(1+\frac{j}{m}\right)^{m} = \log A - \log P.$$

Solving this equation for n, we have

$$[17] \qquad n = \frac{\log A - \log P}{\log(1+j/m)^{m}};$$

and solving for j,

$$[18] \qquad j = m\left[\operatorname{antilog}\left(\frac{\log A - \log P}{mn}\right) - 1\right].$$

Obviously, if m is equal to one, [18] becomes a formula for finding the effective rate i.

Expressions for A and P in any numerical problem are so readily solved for n or j that the student will usually find it much more convenient, as well as profitable, to perform the algebraic steps necessary to obtain these values rather than to depend upon the above formulas.

EXERCISES

1. On his 15th birthday A has \$782.38 in his savings account. He decides to leave it undisturbed until it has accumulated to an even \$1,000. How long must he wait if his savings accumulate at 3%, compounded semiannually? *Ans.* 8.24 years.

2. A large development company, desiring money for a new project, offers to pay \$2,000 at the end of $6\frac{1}{2}$ years for every \$1,000 loaned to it for investment. (*a*) What rate (j, $m = 4$) is the investor being offered? (*b*) If the company finds at the end of 5 years that it can repay a loan of \$50,000, what sum is required if it is allowed to settle at the interest rate determined by the original contract?

3. Delinquent taxes to the amount of \$4,772.16 went unpaid for 3 years. At the end of that time \$5,000 was accepted as full payment. What effective rate of interest did the delay cost? *Ans.* .0157.

4. Solve for the missing quantities in each of the problems listed below:

	A	P	n (Yrs.)	j	m
a.	\$1600	\$1200	--?--	.05	1
b.	1600	1150	8	--?--	1
c.	2400	1500	--?--	.05	4
d.	630	300	12	--?--	2
e.	375	250	7	--?--	2

5. **A** and **B** each invest the same sum of money in separate enterprises. **A** realizes $(.04, m = 4)$ on his investment, while **B** realizes $(.06, m = 2)$ on his investment. How long will it be before **B**'s total investment, principal plus interest, will be three times that of **A**? *Ans.* 56.87 years.

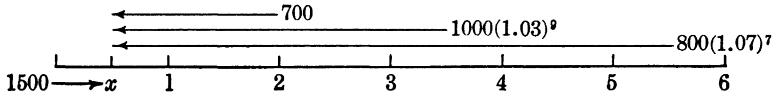
6. A certain community had a population of 18,232 in 1910. The 1940 census showed that the population had grown to 41,876. What was the annual rate of increase during the intervening period, assuming the increase was according to the compound-interest law?

16. Equation of value. Probably one of the most fundamental principles in the solution of financial problems is that *when making comparisons of different amounts of money all amounts involved must be evaluated on a common date.* An equation involving the evaluation of several sums in this way is known as *an equation of value.*

The replacement of several items of indebtedness, due on different dates, by a single debt obligation offers an excellent illustration of this principle. Most interest-bearing debts require that interest on the outstanding debt be paid at the end of each conversion period, and the evaluation of such contracts can best be presented in a later chapter (see Section 31, pages 65–67). The important principle involved is more easily introduced and emphasized by the simpler problems in which periodic interest payments are not introduced. The following types of problems are of sufficiently frequent occurrence to merit consideration.

Example 1. **A** owes three debts: \$700 due in 2 years without interest; \$1,000 due at the end of 4 years with accumulated interest for $4\frac{1}{2}$ years at $(.06, m = 2)$; and an \$800 debt, contracted one year ago, to be paid 6 years hence with interest at 7%. He wishes to pay \$1,500 now, and the remainder of the indebtedness 6 months hence. If money is worth $(.04, m = 2)$, what payment must be made at the end of the 6-months period?

Solution. Let us take the date on which **A** wishes to complete the settlement, 6 months hence, as the comparison date. The problem may be diagramed thus:



Denoting the payment to be made by x, an equation of value is as follows:

$$\begin{aligned}1500(1.02)^{1} + x &= 700(1.02)^{-3} + 1000(1.03)^{9}(1.02)^{-7} + 800(1.07)^{7}(1.02)^{-11}\\ &= 659.63 + 1135.88 + 1033.18 - 1530\\ &= \$1{,}298.69.\end{aligned}$$

The following general statement should be remembered in evaluating problems involving debts and their repayment:

The sum of the debts is always equal to the sum of the payments, ***all evaluated on a common date.***

It is also worth while to emphasize that, *compound interest being used*, the choice of a date as the comparison date is absolutely immaterial. To illustrate this fact, let us write the equation of value for the above problem, using comparison dates at (*a*) the end of 4 years, (*b*) the end of 15 years, and (*c*) $2\frac{1}{2}$ years before the present.

(*a*) $1500(1.02)^{8} + x(1.02)^{7} = 700(1.02)^{4} + 1000(1.03)^{9} + 800(1.07)^{7}(1.02)^{-4}$.

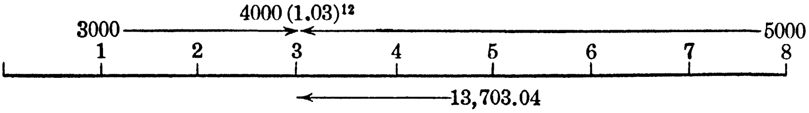
(*b*) $1500(1.02)^{30} + x(1.02)^{29} = 700(1.02)^{26} + 1000(1.03)^{9}(1.02)^{22}$
$+ 800(1.07)^{7}(1.02)^{18}$.

(*c*) $1500(1.02)^{-5} + x(1.02)^{-6} = 700(1.02)^{-9} + 1000(1.03)^{9}(1.02)^{-13}$
$+ 800(1.07)^{7}(1.02)^{-17}$.

It is obvious that each of these equations is the equation used in the solution above, multiplied by the factor $(1.02)^{k}$, with k taking on the values 7, 29, and -6 respectively.

Example 2. The following three debts are to be paid: \$3,000 due in one year without interest; a debt of \$4,000 made 3 years ago and due 3 years from today with interest at $(.06, m = 2)$; and \$5,000 due without interest in 8 years. If money is worth 5%, compounded semiannually, when will a single payment equal to the maturity value of the three debts exactly pay off the indebtedness? (Such a date is called the *average due* or *equated date.*)

Solution. The combined maturity value of the debts is \$13,703.04, that is, $3000 + 4000(1.03)^{12} + 5000$. We cannot locate the \$13,703.04 at its proper place on the diagram, since n is unknown. However, this is not necessary. Let us take the end of the third year as the comparison date, and denote by t the time between the end of the 3d year and the date on which the single payment of \$13,703.04 must be made, t taking the form $+ n$ or $- n$ according as $(1.025)^{2t}$ is greater than or less than unity.



$$13{,}703.04(1.025)^{2t} = 3000(1.025)^{4} + 4000(1.03)^{12} + 5000(1.025)^{-10}$$

$$(1.025)^{2t} = \frac{3311.44 + 5703.04 + 3905.99}{13{,}703.04} = \frac{12{,}920.47}{13{,}703.04}$$

The value of this quotient is evidently less than unity; hence t takes the form $- n$, and is therefore evaluated from the table $(1 + i)^{-n}$.

$$\begin{aligned} \log(1.025)^{-2n} &= \log 12{,}920.47 - \log 13{,}703.04 \\ &= 4.1112783 - 4.1368170 \\ &= 9.9744613 - 10. \\ 2n &= 2.37 +. \\ n &= 1.19. \end{aligned}$$

The date of the payment is therefore $3 + n = 3 + 1.19$, or 4.19 years from the present.

In determining the equated date the present (zero on the time scale) is always a convenient comparison date, since, as is evident, in that case the value of n corresponding to t will always be negative. Moreover, the numerical value of n thus determined will always be the value sought, since it is measured from the present. This advantage may be offset, however, by the fact that other comparison dates may give rise to simpler numerical computation.

Approximate methods, adapted to problems in which the respective durations are short, are discussed in a later chapter. (See Section 63, C, formula [71], page 131.)

EXERCISES

1. On January 1, 1943, **A** owed three debts: a \$3,000 note dated January 1, 1941, and due with interest at $(.04, m = 4)$ on July 1, 1948; \$4,000 due January 1, 1946, without interest; and \$3,000 due without interest on January 1, 1953. He paid \$6,500 on January 1, 1947. If money was worth $(.05, m = 2)$, what payment would he make on January 1, 1950, to complete paying off the indebtedness? *Ans.* \$4,276.96.

2. If money is worth 5%, find when a single payment of \$10,000 will pay off these debts: \$3,000 due in 3 years without interest; \$2,000 due in 5 years, with interest from today at $(.06, m = 2)$; and \$5,000 due in 10 years without interest.

3. Find the equated date for the following noninterest-bearing debts, with money worth 6%: \$300 due in 90 days; \$500 due in 60 days; and \$1,200 due in 8 months. (See Ex. 2, p. 132.) *Ans.* 174.4 days.

4. The executor of **A**'s estate finds the following among the papers of the deceased: *debts owed to A* in the form of (*a*) a \$5,000 note made 4 years ago and due 2 years hence with interest at 6%, (*b*) a debt of \$11,000 contracted 3 years ago, to be paid with interest at 5% eight years from the date of signing the contract, (*c*) \$400 due in 10 months from now without interest, and (*d*) a noninterest-bearing note for \$700 which has 157 days yet to run; *debts owed by A*, namely, (*e*) a \$4,000 note made one year ago and due with 4% interest one year hence, and (*f*) \$15,000 due 4 years from now, with 5 years' accumulated interest at 5%, compounded semiannually. Everything must be ready for settlement in 18 months. If money is worth $(.04, m = 2)$, what sum S will it take at that time to balance the accounts of the deceased? Set up the problem and solve it algebraically for S, leaving the result in the simplest form for numerical computation.

5. **X** owes **Y** a debt of \$2,000 due in 2 years without interest, and another debt, including interest, totaling \$9,628.24, due in 8 years. He wishes to pay these in two payments, the second one double the first, made at the ends of the third and fifth years respectively. Find the amount of each payment if money is worth 4%, compounded quarterly. *Ans.* \$3,502.66 at end of 3 years.

6. A grocery company owes a wholesaler a bill of \$1,800 which is 14 months overdue. The grocery company holds two noninterest-bearing notes, one for \$800 due in 2 years and one for \$1,200 due in 14 months, which it offers the wholesaler in settlement. If money is worth 4%, who is the loser in such a settlement, and by how much?

7. A young couple go into debt \$300 for furniture, \$450 for a car, and \$150 for insurance. Each of these debts bears interest at $(.06, m = 4)$. The bills are paid by 6 quarterly instalments which provide for both debt and interest. What amount must the young couple be ready to pay on each of these payment dates? *Ans.* \$157.97.

8. A had two paid-up endowment insurance policies, one for \$2,500, maturing in 3 years, and one for \$5,000, which would mature in 6 years. A bank loaned **A** the maturity value of his insurance discounted at 6%. Two years later **A** repaid the loan with interest at $(.05, m = 2)$. What amount did **A** pay the bank?

9. Three debts of \$1,000, \$950, and \$1,050 are due at the ends of the third, fourth, and fifth years respectively. What rate of interest may money be said to be worth if the three debts are settled by a single payment of \$3,000 made at the end of the fourth year? *Ans.* 5%.

17. Compound discount. Since many borrowers are only occasional borrowers, the usefulness of compound discount is probably not so apparent. From the standpoint of the lender, however, compound discount plays quite an important role. A loan company, for instance, on receiving the amount of the loan, may immediately use the proceeds as capital for discounting other commercial paper. The rate of discount to the loan company is operating as compound discount.

If an amount A is discounted for one year at a rate d, its present value is, as we know, $P = A(1 - d)$, which may be written as $A = P(1 - d)^{-1}$. This relation says that if P dollars are invested in discounting a note at rate d for one year, the note will be repaid at the end of the year by an amount $A = P(1 - d)^{-1}$. Similarly, this amount, $P(1 - d)^{-1}$, reinvested in the same way for the next year, will be repaid at the end of the next year by an amount $A = P(1 - d)^{-1} \cdot (1 - d)^{-1}$, or $P(1 - d)^{-2}$, and so on. It may be demonstrated that at the end of n years the value of P so invested will be

$$A = P(1 - d)^{-n}. \qquad [19]$$

In compound discount, as in compound interest, we distinguish between nominal and effective rates. We denote by d the *effective rate of discount*, the rate used when the number of conversion periods per year is $m = 1$; and we denote by f the *nominal rate of discount*, used when the number of conversion periods per year is different from 1. The general formula may then be written

$$A = P\left(1 - \frac{f}{m}\right)^{-mn}. \qquad [20]$$

The total accumulation to P in a given period is $A - P$. In order that a given nominal rate of discount f, compounded m times per year, be equivalent to an effective rate d, we must have, therefore,

$$P(1-d)^{-n} - P = P\left(1 - \frac{f}{m}\right)^{-mn} - P,$$

or

$$1 - d = \left(1 - \frac{f}{m}\right)^{m},$$

from which the following relations readily follow:

$$[21] \qquad d = 1 - \left(1 - \frac{f}{m}\right)^{m};$$

$$[22] \qquad f = m[1 - (1-d)^{\frac{1}{m}}].$$

Values of $(1 - d)^n$ for the various values of n and d have so far not been tabulated. Except for special values of f and m in which the binomial theorem may be used to advantage, logarithms offer the best means of evaluation.

Note. Although r and i are used to differentiate between simple and compound (effective) interest rates, no such differentiation has been made in discount rates. Whether d denotes a simple or a compound discount rate will be indicated in the context.

EXERCISES

1. Bills due in 30 days are discounted 2% of their face value if paid within 10 days (20 days before they are due). If a company could use its money to take advantage of such discounts every 20 days, what nominal rate (f, $m = 18$) would it be making? What would be the corresponding effective rate d? *Ans.* 36%; 30.49%.

2. From the relations between the elements of the compound-interest and compound-discount formulas, show that (a) $d = iv$ and (b) $v + d = 1$.

3. What is the least rate of interest (j, $m = 2$) that will equitably replace a discount rate of ($f = .06$, $m = 12$)? (*Suggestion:* Readily evaluated by means of the binomial theorem.)

4. Determine the effective discount rate d which is equivalent to the interest rate (.04, $m = 4$). *Ans.* .0390.

5. Express each of the four letters i, j, d, and f, in terms of each of the other three in turn, and tabulate as indicated in the table below.

	i	j	d	f
i	✕			
j		✕		
d			✕	
f				✕

6. A bank is restricted to \$30,000 for investment in discounting short-term notes. If the discount rate used is ($f = .06$, $m = 4$), what amount of capital invested at an interest rate of (.06, $m = 2$) will be required to yield an equivalent income each year? *Ans.* \$30,040.14.

7. A loan and discount company incorporates for \$100,000. If the company uses a discount rate of 6%, compounded quarterly, and is able to keep 90% of this capital and its earnings invested, find to the nearest dollar the value of the original investment 10 years hence. *Ans.* \$174,738.

MISCELLANEOUS EXERCISES

1. Find to four decimal places, by interpolation, the nominal rate, compounded quarterly, at which \$10,000 will accumulate to \$14,897.22 in 4 years and 9 months. *Ans.* .0847.

2. A owes \$1,000. He pays \$5 interest at the end of each month on the loan. To what effective rate does this interest payment correspond?

3. A certain investment has yielded, on the average, a rate of 4.2% over a period of years. If this rate is maintained in the future, what amount invested now will be worth \$40,000 at the end of 15 years, assuming that earnings are reinvested along with the capital each year? *Ans.* \$21,579.66.

4. A company is selling a product for which many of the purchasers pay on the monthly instalment plan. What rate of interest, compounded monthly, must the company charge to be equivalent to (.06, $m = 2$)?

5. A made (.05, $m = 2$) on a certain investment for a period of 8 years, and 5% effective for the subsequent 5 years. What nominal rate (j, $m = 2$) for the entire period of 13 years would have produced the same income? *Ans.* .0498.

6. Find the present value of \$2,000 due in 3 years if evaluated at (*a*) 6% compound interest; (*b*) 6% simple interest; (*c*) 6% compound discount; (*d*) 6% simple discount.

7. The population of a certain community is 8756, and it is said to increase 15% every 5 years. Assuming that this rate of increase continues, what will be the population 20 years hence? *Ans.* 15,314.

8. How long will it take money to treble itself if invested (*a*) at 3%? (*b*) at 6%? (*c*) at (.06, $m = 2$)?

9. A owes B a note, due 26 months hence, which with accumulated interest amounts to \$21,973.58. If A makes a cash settlement now, what should he pay (*a*) if the present value is computed at the rate (.06, $m = 2$) for the entire time? (*b*) if the approximate method is used for computing interest for the fractional interest period involved? *Ans.* (*a*) \$19,331.82, (*b*) \$19,333.70.

10. How much does a borrower pay out as interest if he borrows \$1,000 for 5 years at 6% effective, (*a*) if the interest is paid at the end of each year? (*b*) if the interest is paid at the end of 5 years along with the payment of the principal?

11. A father leaves \$30,000 to be divided between his two sons so that both shall receive the same amount on their twenty-first birthdays. The sons are now 8 years old and 14 years old respectively. If the money is invested at 5%, what will each son receive? *Ans.* \$24,174.00.

12. If the older son in Ex. 11 allows his share of the bequest to remain in trust at 5% until the younger son becomes of age, and the two draw their respective amounts at the same time, how much will each receive?

13. One thousand dollars is placed in a savings account which adds 2% interest at the end of each 6 months. At the end of 3 years $500 is withdrawn, and 3 years later an additional $600 is withdrawn. What amount is left in the fund at the time of the second withdrawal? *Ans.* $105.16.

14. Using the binomial theorem, show from the relations

$$(a')\qquad 1+i=\left(1+\frac{j}{m}\right)^m \quad\text{and}\quad (b')\quad 1-d=\left(1-\frac{f}{m}\right)^m$$

that

$$(a)\qquad i=j+\left[\left(1-\frac{1}{m}\right)\cdot\frac{j^2}{2}+\left(1-\frac{1}{m}\right)\left(1-\frac{2}{m}\right)\cdot\frac{j^3}{3!}+\cdots\right];$$

$$(b)\qquad d=f-\left[\left(1-\frac{1}{m}\right)\cdot\frac{f^2}{2}-\left(1-\frac{1}{m}\right)\left(1-\frac{2}{m}\right)\cdot\frac{f^3}{3!}+\cdots\right].$$

What obvious conclusions (which can be proved) would you draw concerning the corresponding nominal and effective rates as to which is numerically the greater, $\left\{\begin{matrix}(a'')\ i \text{ or } j\\ (b'')\ d \text{ or } f\end{matrix}\right\}$, when m is integral? when $m<1$? Check your conclusions, using $\left\{\begin{matrix}(a''')\ j=.06\\ (b''')\ f=.06\end{matrix}\right\}$, finding the corresponding values of i and d, respectively, for $m=3$; also for $m=\frac{1}{3}$.

15. An investment grows at the rate of 6% effective for a period of 3 years and at (.03, $m=4$) for the following 7 years. Its value at the end of the 10 years is $8,000. What was the original value of the investment? *Ans.* $5,448.93.

16. A trust fund of $15,000 was created on March 15, 1930, which bore interest at (.04, $m=2$) until March 15, 1937, (.06, $m=2$) to March 15, 1940, and has borne interest at 5% effective since that time. What is the value of the trust fund today?

17. A has $1,500 invested for 8 years at (.05, $m=2$). What sum could he afford to accept as settlement today if he could reinvest his funds for the same period at 6%? *Ans.* $1,397.09.

18. A borrows $1,000 for 1 year, agreeing to pay 6% simple interest on the loan. At the end of the year he wishes to have the loan extended for 4 years more. This is agreed to, with the provision that interest shall be at 6%, compounded annually, for the last 4 years, all interest to be paid at that time. Is this equivalent to paying (.06, $m=1$) for the entire 5 years? Demonstrate your answer.

19. A plant and its equipment are valued at $50,000. Wear and depreciation, not cared for by current repairs, are estimated at 2% per year. That is, at the end of the first year its value, on this basis, would be $49,000; at the end of the second year, $49,000 less 2% of $49,000, or $48,020; and so on. Determine the depreciated value of the plant and equipment at the end of 10 years. *Ans.* $40,853.66.

20. An heir is left $30,000 which is invested at (.04, $m=4$). At the end of each year he may withdraw 10% of the sum shown to his credit on that date. What sum will remain in the fund at the beginning of the 17th year?

CHAPTER III

ANNUITIES

18. Introduction. The formulas of simple and compound interest are sufficient to solve most of the problems arising in financial transactions. If the number of payments involved is large, however, the computation of the total valuation on any given date becomes quite long and tedious if one uses only those methods thus far presented. Fortunately, most problems involving a large number of payments are such that the payments are both equal and periodic. Rents, interest on investments, mortgage payments, and insurance premiums are familiar examples of equal periodic payments. For such problems, classified as *annuities,* the technique of evaluation can be greatly simplified.

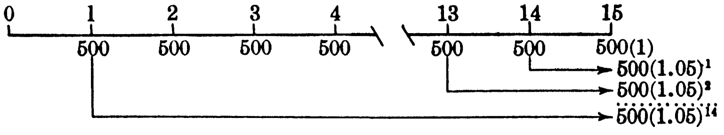
19. Use of geometric progressions and annuity tables. A succession of equal periodic payments, when evaluated at compound interest on a common date, form a sequence of terms which differ only by a common factor, and hence can be summed as a geometric progression. We recall from elementary algebra that if the first term of a geometric progression be denoted by the letter a, the nth term by l, and the ratio of any two successive terms by r, then the sum of the first n terms is

$$S = \frac{rl - a}{r - 1}.$$

Particular forms resulting from the use of this formula are so important that they have been tabulated. We shall illustrate these forms and the use of the corresponding tables by several examples with which the student should become thoroughly familiar.

Example 1. A sets aside $500 annually in a trust fund which allows interest at 5% effective. What amount does **A** have to his credit just after the 15th deposit has been made?

Solution. It is always helpful to picture the problem under consideration by a diagram.



Denote by V_n the value of a sum at n years. The total accumulated value of the deposits at the end of the 15th year is, then,

$$V_{15} = 500[1 + (1.05) + (1.05)^2 + \cdots (1.05)^{14}].$$

The terms in the brackets form a geometric progression in which the first term is $a = 1$, the last term is $l = (1.05)^{14}$, and the common ratio of the successive terms is $r = (1.05)^1$. From these values the sum is readily expressed as

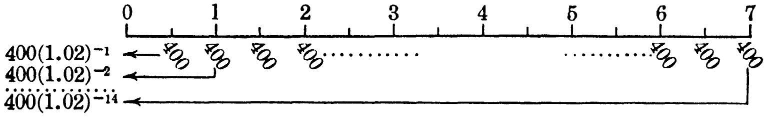
$$V_{15} = 500\left[\frac{(1.05)^{15} - 1}{.05}\right].$$

Without resorting to the table $(1 + i)^n$, the fractional form $\frac{(1+i)^n - 1}{i}$ is found to be one of those which have been tabulated under the symbol $s_{\overline{n}|i}$. Thus we have directly

$$V_{15} = 500(21.57856359) = \$10{,}789.28.$$

Example 2. Payments of \$400 at the end of each 6 months for the next 7 years must be made in order to extinguish the indebtedness on a certain piece of property. If these payments are discounted at (.04, $m = 2$), what sum will pay off the debt immediately?

Solution.



The sum of the present values, as shown on the diagram, may be written as

$$V_0 = 400[(1.02)^{-14} + (1.02)^{-13} + \ldots + (1.02)^{-1}].$$

In this series choose $a = (1.02)^{-14}$, the last term $l = (1.02)^{-1}$, and the common ratio $r = (1.02)^1$, and the sum takes the form

$$V_0 = 400\left[\frac{1 - (1.02)^{-14}}{.02}\right].$$

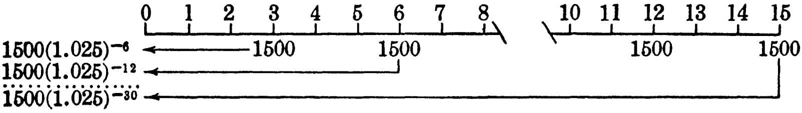
The fractional form found here, $\frac{1 - (1+i)^{-n}}{i}$, is also tabulated. It is found in tables under the symbol $a_{\overline{n}|i}$. From this we have

$$V_0 = 400(12.10624877) = \$4{,}842.50.$$

Note. Since a series may obviously be summed from either end with the same result, always choose a and l so that r shall have a positive exponent. This greatly simplifies the reduction of the fractional forms, obtained by summing the given series, to the tabulated forms as we shall present them.

Example 3. A bridge is to be repainted every third year at a cost of \$1,500. What amount invested immediately at (.05, $m = 2$) will provide for this upkeep for the next 15 years?

Solution.



Here we have

$$V_0 = 1500[(1.025)^{-6} + (1.025)^{-12} + \cdots + (1.025)^{-30}],$$

with $a = (1.025)^{-30}$, $l = (1.025)^{-6}$, and $r = (1.025)^6$; hence,

$$V_0 = 1500\left[\frac{1 - (1.025)^{-30}}{(1.025)^6 - 1}\right].$$

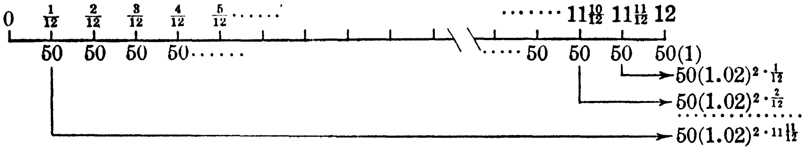
From the forms of the numerator and the denominator we note that if each be divided by .025, we then have a fractional numerator of the form shown in Example 2, and a fractional denominator of the form shown in Example 1. However, since the reciprocal form of the denominator has been tabulated, the numerical calculations are a bit simpler if we write in the following form and evaluate:

$$\begin{aligned} V_0 &= 1500\left[\frac{1 - (1.025)^{-30}}{.025}\right]\left[\frac{.025}{(1.025)^6 - 1}\right] \\ &= 1500\, a_{\overline{30}|.025} \cdot s^{-1}_{\overline{6}|.025}. \\ \log V_0 &= 3.1760913 + 1.3207753 + 9.1946530 - 10 \\ &= 3.6915196. \\ V_0 &= \$4{,}914.96. \end{aligned}$$

In the next example a problem is presented in which fractional conversion periods are involved. *Unless otherwise specified, compound interest will be used for fractional as well as integral conversion periods in the evaluation of annuities.*

Example 4. A has been paying rent of \$85 at the end of each month for the last 12 years. If he had rented for only \$35 per month and banked the difference at (.04, $m = 2$), how much would he now have from this source to apply toward buying property of his own?

Solution.


0
$\frac{1}{12}$
$\frac{2}{12}$
$\frac{3}{12}$
$\frac{4}{12}$
$\frac{5}{12}$……
……$11\frac{10}{12}$ $11\frac{11}{12}$ 12
50 50 50 50……
……50 50 50 50(1)
$50(1.02)^{2\cdot\frac{1}{12}}$
$50(1.02)^{2\cdot\frac{2}{12}}$
……………
$50(1.02)^{2\cdot 11\frac{1}{12}}$

Writing the series for V_{12} as

$$V_{12} = 50[1 + (1.02)^{\frac{1}{6}} + (1.02)^{\frac{2}{6}} + \cdots + (1.02)^{\frac{143}{6}}],$$

we have $a = 1$, $l = (1.02)^{\frac{143}{6}}$, and $r = (1.02)^{\frac{1}{6}}$, from which

$$V_{12} = 50\left[\frac{(1.02)^{24} - 1}{(1.02)^{\frac{1}{6}} - 1}\right].$$

The denominator, if multiplied by 6, is the familiar form used earlier (formula [16], page 19); but since we should like to reduce the numerator to the form shown in Example 1 by dividing by .02, we multiply both numerator and denominator by both 6 and .02, and write

$$V_{12} = 300 \times \frac{(1.02)^{24} - 1}{.02} \times \frac{.02}{6[(1.02^{\frac{1}{6}} - 1]}.$$

With regard to the factor on the right not only is the form in the denominator tabulated, but, for convenience in problems of the type met in this example, — that is, where the payment period is less than the conversion period, — tables for the complete fractional form $\frac{i}{p[(1+i)^{1/p}-1]}$ are also available. Both $\frac{i}{j_{(p)}}$ and $s_{\overline{1|}i}^{(p)}$ are used as symbols for this fractional form. We shall usually use the symbol $s_{\overline{1|}i}^{(p)}$. (See Ex. 3, page 45.) The problem is thus readily evaluated as

$$V_{12} = 300 \times s_{\overline{24|}.02} \times s_{\overline{1|}.02}^{(6)}.$$
$$\log V_{12} = 2.4771213 + 1.4831858 + .0035903 = 3.9638974.$$
$$V_{12} = \$9,202.32.$$

One should note that the numerators of the fractional forms obtained in summing these series, Examples 1 to 4, all take one of two forms, either $1-(1+i)^{-n}$ or $(1+i)^n-1$, according as the present value or the accumulated value is being found. Also it is seen that the denominators are made to take on one of three forms, i, or $(1+i)^n-1$, or $p\,[(1+i)^{\frac{1}{p}}-1]$, according as the number of payment periods *per year* is equal to, is less than, or is greater than the number of interest conversion periods *per year.*

The use of tables for evaluating the various forms which may arise is illustrated above, with the possible combinations which may occur from the corresponding geometric series. Even though we shall develop formulas to eliminate much of the detail displayed in these four examples, the student should carry through a number of numerical problems as has been done above, so as to become thoroughly familiar with each step — diagraming, obtaining the individual terms of the sequence, picking out a, r, and l correctly, and reducing the form of the sum to forms which are tabulated. The answers to practically all questions arising in the use of the various annuity formulas come only through a thorough knowledge of these detailed steps. This last statement cannot be emphasized too strongly; consequently a large number of problems are presented as drill on these important steps before specific formulas are formally presented.

The special forms which have been presented in such detail are useful, of course, only when the rates and values of n involved are values which are tabulated.

EXERCISES

1. A is obliged to pay \$25 at the end of each month for a period of $2\frac{1}{2}$ years as balance on the price of a lot. What is the cash value of the unpaid balance if interest is calculated at $(.06, m = 12)$? *Ans.* \$694.85.

2. A company charges $(.06, m = 12)$ on its loans. A loan from this company is being repaid, principal and interest, by 5 quarterly payments of \$10.50 each the first one 3 months hence. What was the amount of the loan?

3. If A sets aside \$20 at the end of each month for 2 years in a fund which allows interest at a rate equivalent to $(.04, m = 2)$, he will lack only \$1.30 of having enough to pay off a debt due at that time. What is the amount to be paid? *Ans.* \$500.

4. A young man is left a fixed income of \$1,000 annually, \$500 at the end of each 6 months, for the next 10 years. He wishes cash to enter business and offers the annuity contract for sale. How much cash will he be able to raise if these payments are discounted (*a*) at $(.05, m = 4)$? (*b*) at $(.05, m = 2)$? (*c*) at 5% effective?

5. The remaining indebtedness on a car is \$600. Six per cent of this balance is added as a carrying charge, making a total of \$636, to be paid in 20 equal monthly payments of \$31.80 each, the first due in 30 days. (*a*) Find the present value of these payments evaluated at $(.06, m = 12)$. (*b*) Does the answer found in (*a*) mean that the buyer is paying more than 6%, less than 6%, or exactly 6% on his indebtedness? Amplify your answer. *Ans.* (*a*) \$603.80.

6. A trucking company pays out \$700 biennially for insurance on its trucks. What amount set aside now at 4% will pay for the company's insurance for the next 12 years? (Insurance premiums are paid at the beginning of the period which the insurance covers.)

7. Besides \$250 cash, a father sets aside funds sufficient to provide his child with \$250 at the end of each quarter for the next 4 years while the child is in college. If the unused portion of the fund remains invested at the rate $(.03, m = 2)$, what is the amount of the father's immediate outlay? *Ans.* \$4,006.95.

8. In the following problems find both V_0 and V_n, by summing as geometric series and resolving into the proper fractional forms for valuation. The fractional forms are restated here for convenience:

$$s_{\overline{n}|i} = \frac{(1+i)^n - 1}{i} \qquad a_{\overline{n}|i} = \frac{1 - (1+i)^{-n}}{i}$$

$$s^{-1}_{\overline{n}|i} = \frac{i}{(1+i)^n - 1} \qquad s^{(p)}_{\overline{1}|i} = \frac{i}{p[(1+i)^{1/p} - 1]}$$

	Periodic Payment	Payment Periods per Year	j	m	Number of Years
a.	\$250	1	.05	1	5
b.	50	4	.04	4	3
c.	30	12	.06	12	2
d.	80	2	.03	2	4
e.	250	1	.05	4	4
f.	50	4	.06	12	3
g.	30	4	.13	52	1½
h.	600	⅓ (every 3 years)	.04	2	12
i.	125	2	.05	1	5
j.	50	2	.04	½ (every 2 years)	4
k.	30	12	.06	4	3
l.	70	4	.03	2	4

20. Definitions. We shall become more and more aware, as we proceed, of the tremendous importance of the problems illustrated in the preceding list of exercises. It is possible to classify such problems and to develop very convenient formulas which greatly reduce the amount of labor involved in their solution. Professional practice has given us many of the definitions and much of the notation which we shall use in the succeeding paragraphs.

Any set of annual payments form an annuity. Usage has, however, caused us to accept the term *annuity* as referring to *equal payments* made *at equal intervals of time.* Annuities which vary from this accepted definition will be specifically defined. In Part I of this text we are concerned with only such annuities as have the duration definitely specified. Such an annuity is called an *annuity certain,* or simply an *annuity.*

If the payments are made *at the end of each payment interval,* — as, for instance, interest payments on bonds, — the annuity is called an *annuity immediate.* If the payments are made *at the beginning of the payment interval,* as is often the case in paying rent, the annuity is called an *annuity due.* The distinctions are easily remembered by the apparent contradiction in nomenclature, the annuity due being the one in which the first payment is made immediately, and the annuity immediate the one in which the first payment is due at the end of the first payment interval.

The word "annuity," as we shall use it, will always mean an *annuity certain immediate,* unless otherwise specified.

21. Notation. The notation adopted at this point is important; it is as follows:

$R =$ the average *yearly payment,* called the *annual rent.*
$p =$ the number of payment periods *per year* (p, integral or fractional); hence periodic payments of $\frac{R}{p}$ made every $\frac{1}{p}$ year.
$j =$ the nominal rate *per year.*
$m =$ the number of conversion periods *per year.*
$R \cdot {}^{(m)}a^{(p)}_{\overline{n}|j}$* $= V_0$, a lump sum *at the beginning of the first payment interval,* equivalent to the present value of annuity payments of $\frac{R}{p}$ made at the end of every $\frac{1}{p}$ year for n years, and called the *present value of the annuity.*
$R \cdot {}^{(m)}s^{(p)}_{\overline{n}|j} = V_n$, a lump sum *at the time of the last payment,* equivalent to the accumulated value of annuity payments of $\frac{R}{p}$ made at the end of every $\frac{1}{p}$ year for n years, and called the *amount of the annuity.*

---

* Read: "R times a, angle n (or simply, "n," omitting the word "angle"), upper left m, right p, at rate j." (Note the *script a,* which must later be distinguished from the printed a, as explained in the Note on page 55.)

If $R = m = p = 1$, and hence $j = i$, then we evidently have

$a_{\overline{n}|i} =$ the value, at the beginning of the year of the first payment, of \$1 a year for n years.

$s_{\overline{n}|i} =$ the value, at the time of the last payment, of \$1 a year for n years.

The above notation provides symbolic expressions for the solution of a great variety of problems; these expressions are easily interpreted and are largely self-explanatory.

EXERCISES

1. Diagram and interpret by a detailed verbal statement the meaning of each of the following symbols:

a. $800 \cdot {}^{(2)}s^{(4)}_{\overline{5}|.06}$.
b. $500 \cdot {}^{(2)}a^{(2)}_{\overline{8}|.04}$.
c. $1200 \cdot {}^{(4)}a^{(12)}_{\overline{10}|.04}$.
d. $1000 \cdot s^{(2)}_{\overline{5}|.05}$.
e. $1000 \cdot {}^{(2)}s_{\overline{6}|.05}$.
f. $1500 \cdot {}^{(4)}a^{(\frac{1}{3})}_{\overline{12}|.04}$.

2. Diagram and interpret each of the following:

a. $1 + a_{\overline{9}|.03}$.
b. $s_{\overline{14}|.05} - 1$.

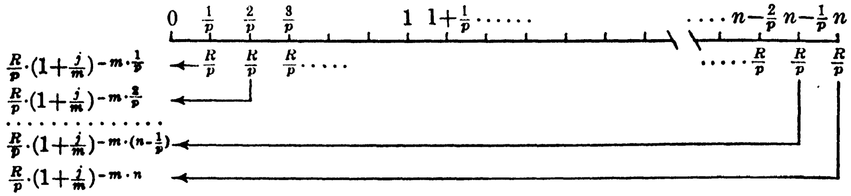
22. Formulas for the evaluation of annuities. The development of formulas for the evaluation of annuities is readily carried out by exactly the same procedure as that used in the evaluation of the numerical problems.

Since there is the obvious relation,

$$V_0\left(1 + \frac{j}{m}\right)^{mn} = V_n, \tag{23}$$

we can readily write down the formulas for $R \cdot {}^{(m)}s^{(p)}_{\overline{n}|j}$ from those of $R \cdot {}^{(m)}a^{(p)}_{\overline{n}|j}$, and vice versa.

Let us set up and sum the geometric series for the present value, V_0, of an annuity of R dollars per year, paid in p payments per year, for a period of n years, with interest computed at a nominal rate j, converted m times per year.



0
$\frac{1}{p}$
$\frac{2}{p}$
$\frac{3}{p}$
1
$1+\frac{1}{p}\cdots\cdots$
$\cdots\, n-\frac{2}{p}$
$n-\frac{1}{p}$
n
$\frac{R}{p}\cdot(1+\frac{j}{m})^{-m\cdot\frac{1}{p}}$
$\frac{R}{p}$
$\frac{R}{p}$
$\frac{R}{p}\cdots\cdots$
$\cdots\cdots\frac{R}{p}$
$\frac{R}{p}$
$\frac{R}{p}$
$\frac{R}{p}\cdot(1+\frac{j}{m})^{-m\cdot\frac{2}{p}}$
$\cdots\cdots\cdots\cdots\cdots\cdots$
$\frac{R}{p}\cdot(1+\frac{j}{m})^{-m\cdot(n-\frac{1}{p})}$
$\frac{R}{p}\cdot(1+\frac{j}{m})^{-m\cdot n}$

$$\therefore R \cdot {}^{(m)}a^{(p)}_{\overline{n}|j} = \frac{R}{p}\left[\left(1 + \frac{j}{m}\right)^{-mn} + \left(1 + \frac{j}{m}\right)^{-m\left(n-\frac{1}{p}\right)} + \cdots + \left(1 + \frac{j}{m}\right)^{-\frac{m}{p}}\right].$$

The geometric series contained in the brackets has for its first term $a = \left(1 + \frac{j}{m}\right)^{-mn}$, for its last term $l = \left(1 + \frac{j}{m}\right)^{-\frac{m}{p}}$, and for a common ratio

$r = \left(1 + \frac{j}{m}\right)^{\frac{m}{p}}$. The formula for the *present value of the annuity* thus becomes

[24] $$R \cdot {}^{(m)}a_{\overline{n}|j}^{(p)} = \frac{R}{p} \times \frac{1 - (1 + j/m)^{-mn}}{(1 + j/m)^{m/p} - 1}.$$

From formula [23] the corresponding *amount of this annuity* is therefore

[25] $$R \cdot {}^{(m)}s_{\overline{n}|j}^{(p)} = \frac{R}{p} \times \frac{(1 + j/m)^{mn} - 1}{(1 + j/m)^{m/p} - 1}.$$

As evidenced by the solution of the numerical problems in Section 19, the fractional expressions on the right in formulas [24] and [25] may each be expressed symbolically in very simple forms which are tabulated for most values of n and j; these forms vary, as in Section 19, according as m is equal to, greater than, or less than p.

In the special case where $R = m = p = 1$ we have the invaluable and much used forms

[26] $$a_{\overline{n}|i} = \frac{1 - (1 + i)^{-n}}{i},$$

[27] $$s_{\overline{n}|i} = \frac{(1 + i)^n - 1}{i}.$$

EXERCISES

[If calculating machines are available]

1. Since $s_{\overline{n}|i} = 1 + (1 + i) + (1 + i)^2 \cdots (1 + i)^{n-1}$, and therefore $s_{\overline{1}|i} = 1$, $s_{\overline{2}|i} = 1 + (1 + i)^1$, etc., the $s_{\overline{n}|i}$ table may be constructed by continuous addition from a table of $(1 + i)^n$. Using the table constructed for $(1.03)^n$ in Ex. 1, page 16, construct a table of $s_{\overline{n}|.03}$, $n = 1, 2, 3, \cdots, 20$. Check your results with published tables.

2. Since $a_{\overline{n}|i} = v + v^2 + v^3 + \cdots v^n$, construct, in a manner similar to that in Ex. 1, above, a table of $a_{\overline{n}|.03}$, $n = 1, 2, 3, \cdots, 20$. Check your results with published tables.

In formulas [24] and [25], if $m = p \neq 1$, we may use a symbolic notation consistent with formulas [26] and [27] to obtain the following:

[28] $$R \cdot {}^{(m)}a_{\overline{n}|j}^{(p)} = \frac{R}{p} \times \frac{1 - (1 + j/m)^{-mn}}{j/m} = \frac{R}{p} \cdot a_{\overline{mn}|j/m}.$$

[29] $$R \cdot {}^{(m)}s_{\overline{n}|j}^{(p)} = \frac{R}{p} \times \frac{(1 + j/m)^{mn} - 1}{j/m} = \frac{R}{p} \cdot s_{\overline{mn}|j/m}.$$

NOTE. Notice that formulas [26] and [28] are of exactly the *same form*, as are, in a similar way, formulas [27] and [29]. For instance, whether $1 \cdot a_{\overline{10}|.03}$ is the result of \$1 per year for 10 years at rate 3% or the result of a \$1 payment each 6 months for 5 years at (.06, $m = 2$) is immaterial in so far as tabulated values are concerned, for in either case the numerical value is found under *the form* $a_{\overline{n}|i}$. Evidently a similar statement is true for $s_{\overline{n}|i}$ and $s_{\overline{mn}|j/m}$. (See also footnote, page 14.)

If $m > p$, and if m is an exact multiple of p, so that $\frac{m}{p}$ is an integer, say k, then formula [24] may be written as

$$R \cdot {}^{(m)}a_{\overline{n}|j}^{(p)} = \frac{R}{p} \times \frac{1 - (1 + j/m)^{-mn}}{j/m} \times \frac{j/m}{(1 + j/m)^{k} - 1},$$

or

$$R \cdot {}^{(m)}a_{\overline{n}|j}^{(p)} = \frac{R}{p} \cdot a_{\overline{mn}|\,j/m} \cdot s_{\overline{k}|j/m}^{-1}. \tag{30}$$

In a similar way formula [25] becomes

$$R \cdot {}^{(m)}s_{\overline{n}|j}^{(p)} = \frac{R}{p} \cdot s_{\overline{mn}|j/m} \cdot s_{\overline{k}|j/m}^{-1}, \tag{31}$$

where $s_{\overline{k}|j/m}^{-1}$ is the reciprocal of $s_{\overline{k}|j/m}$, the -1 being an exponent. Example 3, page 35, is of this type.

If $m < p$, and if m is an exact divisor of p, so that $\frac{p}{m}$ is an integer, say p', and hence $p = mp'$, then

$$R \cdot {}^{(m)}a_{\overline{n}|j}^{(p)} = \frac{R}{m} \times \frac{1 - (1 + j/m)^{-mn}}{j/m} \times \frac{j/m}{p'[(1 + j/m)^{\frac{1}{p'}} - 1]},$$

or

$$R \cdot {}^{(m)}a_{\overline{n}|j}^{(p)} = \frac{R}{m} \cdot a_{\overline{mn}|j/m} \cdot s_{\overline{1}|j/m}^{(p')}; \tag{32}$$

and similarly

$$R \cdot {}^{(m)}s_{\overline{n}|j}^{(p)} = \frac{R}{m} \cdot s_{\overline{mn}|j/m} \cdot s_{\overline{1}|j/m}^{(p')}. \tag{33}$$

Example 4, page 36, is of this type.

A complete understanding of the above formulas makes it possible to evaluate almost any problem involving annuities if the proper values of R, p, m, j, and n are chosen. Since each of these is defined on an annual basis, their values are usually fairly obvious from the statement of the problem. This statement does not mean, however, that all problems are solved by a mere substitution in a formula. The student will find ample opportunity to exercise his abilities in the interpretation and use of annuities in many different ways. A complete mastery of these formulas does, however, reduce the number of formulas so often presented for the various fields of work encountered in financial problems.

Other formulas in the remaining pages of this text are given mainly to provide a convenient form in which the solution of a particular type of problem may be expressed. Aside from the accumulation and discount factors, the analysis and set-up of the solution in almost every case requires a clear comprehension of the power and sufficiency of the above formulas in solving financial problems.

A general theorem, which facilitates the evaluation of annuities by combining all the formulas [26] to [33] into a single statement, is as follows:

Theorem 1. *To evaluate* $R \cdot {}^{(m)}a^{(p)}_{\overline{n}|j}$ *and* $R \cdot {}^{(m)}s^{(p)}_{\overline{n}|j}$, *divide* R, m, p, *and* j *by* m; *multiply* n *by* m; *and set the fraction* $\frac{p}{m}$ *over the factor* $s_{\overline{1}|j/m}$; *thus:*

$$R \cdot {}^{(m)}a^{(p)}_{\overline{n}|j} = \frac{R}{m} \cdot a_{\overline{mn}|j/m} \cdot s^{(p/m)}_{\overline{1}|j/m}. \tag{34}$$

$$R \cdot {}^{(m)}s^{(p)}_{\overline{n}|j} = \frac{R}{m} \cdot s_{\overline{mn}|j/m} \cdot s^{(p/m)}_{\overline{1}|j/m}. \tag{35}$$

If $\frac{p}{m}$ is an integer p', then $s^{(p')}_{\overline{1}|j/m}$ is evaluated directly from the tables; if $\frac{m}{p}$ is an integer, say k, then replace $s^{(p/m)}_{\overline{1}|j/m}$ by $k \cdot s^{-1}_{\overline{k}|j/m}$, the second factor of which is also tabulated.

The proof of this theorem is, of course, contained in the development of the several preceding formulas. It might be helpful, however, to call special attention to one or two details. For instance, when $m > p$ and $s^{(p/m)}_{\overline{1}|j/m}$ is replaced by $k \cdot s^{-1}_{\overline{k}|j/m}$, the product of the coefficients k $\left(\text{i.e., } \frac{m}{p}\right)$ and $\frac{R}{m}$ gives $\frac{R}{p}$, as shown in forms [30] and [31]. The notation was chosen to comply more conveniently with that of the tables. Also, in the special case where $m = p$, the factor $s^{(p/m)}_{\overline{1}|j/m}$ in the general form reduces, of course, to $s_{\overline{1}|j/m}$, which is always numerically equal to one. That $s_{\overline{1}|j/m} = 1$ is evident either from its verbal interpretation or from simplifying the algebraic form [27] with $n = 1$. Formulas [28] and [29] are results of this simplification.

Example 1. On a given publication an author is to receive a royalty of 30 periodic payments of \$500 each, the first payment to be made 3 months hence. What cash consideration could the author equitably consider (*a*) if the payments are evaluated at (.06, $m = 2$)? (*b*) if evaluated at (.06, $m = 12$)?

Solution. *a.* In this problem $R = 2000$, $p = 4$, $m = 2$, $j = .06$, and $n = 7\frac{1}{2}$. We may therefore write down immediately

$$2000\,{}^{(2)}a^{(4)}_{\overline{7\frac{1}{2}}|.06} = 1000\, a_{\overline{15}|.03} \times s^{(2)}_{\overline{1}|.03} = \$12{,}026.81.$$

b. The only change from the symbolic form of *a* is that here $m = 12$ instead of $m = 2$. The simplification thus takes the form

$$\begin{aligned} 2000\,{}^{(12)}a^{(4)}_{\overline{7\frac{1}{2}}|.06} &= \tfrac{2000}{12} \times a_{\overline{90}|.005} \times s^{(\frac{1}{3})}_{\overline{1}|.005} \\ &= 500 \times a_{\overline{90}|.005} \times s^{-1}_{\overline{3}|.005} \\ &= \$11{,}995.14. \end{aligned}$$

Example 2. A small manufacturing company decides to set aside \$2,500 at the end of each 6 months in a depreciation fund. What amount will the fund contain at the end of 8 years if (*a*) the fund credits interest at (.05, $m = 2$)? (*b*) if interest is credited at 5% effective?

Solution. *a.* With $R = 5000$, $p = 2$, $n = 8$, $j = .05$, and $m = 2$, the amount is given by

$$\begin{aligned} 5000 \cdot {}^{(2)}s^{(2)}_{\overline{8}|.05} &= 2500 \times s_{\overline{16}|.025} \times s^{(1)}_{\overline{1}|.025} \\ &= 2500(19.38022483)(1) = \$48{,}450.56. \end{aligned}$$

b. **If interest is credited at 5% effective, then**

$$\begin{aligned} 5000 \cdot s^{(2)}_{\overline{8}|.05} &= 5000 \times s_{\overline{8}|.05} \times s^{(2)}_{\overline{1}|.05} \\ &= 5000(9.5491089)(1.0123475) \\ &= \$48{,}335.08. \end{aligned}$$

Example 3. The income for the next $3\frac{1}{2}$ years from a 3.2% investment of \$100,000 is voted for new equipment. Find to the nearest dollar the amount thus made available.

Solution. The annuity tables are of little value here, since mn is not integral and the rate of interest is not among those tabulated. One method of evaluation is to use the fractional form obtained from summing the geometric series, formula [24], and evaluate with the aid of logarithms. Thus, since the value of $(1.032)^{-3\frac{1}{2}}$ is readily found to be .8956144, we have

$$\begin{aligned} 3200 \cdot {}^{(1)}a^{(1)}_{\overline{3\frac{1}{2}}|.032} &= 3200 \times \frac{1 - (1.032)^{-3\frac{1}{2}}}{.032} \\ &= 3200 \times \frac{1 - .8956144}{.032} \\ &= \$10{,}439. \end{aligned}$$

23. Unequal conversion interval and payment interval. It is pertinent at this point to anticipate the importance of emphasizing annuities in which the conversion interval and the payment interval are of different duration. In actual practice, on account of the seeming simplicity in calculation and the bookkeeping connected with a given investment, interest is, more often than not, computed on the same period basis as that on which the payments are made. However, this is not always the case, nor is it oftentimes the most important consideration.

The interest rate involved in a given contract is very often dictated by competition in which the competitive contract is on an entirely different payment basis. The deciding factor in making a particular financial transaction is often revealed by comparisons in which various conversion and payment intervals are involved. An investment on which dividends are paid annually at .0404, for instance (such "odd" interest rates are often met with in practice), may be much more easily evaluated from the form (.04, $m = 2$). Interest *at the rate* (j, $m = 2$), say, does not necessarily mean that interest is actually being paid twice a year. Making a choice of assets for a given purpose nearly always hinges on evaluations in which $m \neq p$.

In these, and in many other places, the more general annuity formulas are invaluable. Moreover, the more general annuity formulas not only readily take care of the so-called simpler cases but also greatly reduce the number of special formulas ordinarily presented for handling special types of problems met with later in the text. As in other fields of work, the more general the application — if it can be made simply — the more valuable the procedure. The student will find this to be amply illustrated in the use of the above formulas.

EXERCISES

1. In buying a piece of property a cash payment of \$1,000 is made, the remainder to be paid by quarterly payments of \$500 each over a period of 5 years. What is the cash value of the property if money is worth $(.05, m = 2)$? *Ans.* \$9,806.43.

2. Find to the nearest cent the sum to which \$10,000 a year for 20 years will accumulate at 4% under the following conditions: (*a*) payments semiannually, interest converted semiannually; (*b*) payments semiannually, interest converted annually; (*c*) payments annually, interest converted semiannually.

3. Diagram, set up, and sum the series for $s^{(p)}_{\overline{1|}i}$, and thus justify from this result the notation encountered earlier in the tables, namely, $s^{(p)}_{\overline{1|}i} = \frac{i}{j_{(p)}}$.

4. A fund is accumulated by making monthly payments of \$50 each, over a period of 10 years. Interest is allowed at $(.04, m = 4)$.

a. Show that the total amount in the fund at the end of the 10 years would be the same if the monthly payments were replaced by quarterly payments (i.e., payments each conversion period) of $150 \cdot s^{(3)}_{\overline{1|}.01}$ each.

b. Set up and simplify the expression for the value of the annuity as originally stated. Note the results in the light of *a*.

5. A is investing \$400 every 6 months in a loan company which yields the investor $(.06, m = 12)$.

a. Show that the value at the end of n years would be just the same if he should make monthly payments (i.e., payments each conversion period) of $400 \cdot s^{-1}_{\overline{6|}.005}$ each instead of the specified semiannual payments.

b. Set up and simplify the expression for the value of the annuity as originally stated. Note the results in the light of *a*.

6. *a.* Diagram and interpret $P \cdot s_{\overline{t|}r}$.

b. Extend the interpretation in *a* to the case in which $P = \frac{R}{p} \cdot s^{-1}_{\overline{k|}j/m}$, $t = mn$, and $r = \frac{j}{m}$, and thus interpret the meaning of the component factors in the final form of formula [31].

c. Extend the interpretation in *a* to the case in which $P=\frac{R}{m}\cdot s^{(p)}_{\overline{1}|j/m}$, $t=mn$, and $r=\frac{j}{m}$, and thus interpret the meaning of the component factors in the final form of formula [33].

d. More generally, interpret *a* if $P=\frac{R}{m}\cdot s^{(p/m)}_{\overline{1}|j/m}$, $t=mn$, and $r=\frac{j}{m}$, and apply your verbal statement to formulas [34] and [35].

Similar interpretations can obviously be made of formulas [30] and [32].

7. A farm is offered for $8,000 cash, or $4,000 cash and 5 equal annual payments of $900 each. If money is worth 4% effective, by what amount do these offers differ at the time they are made? *Ans.* $6.64 more by annual payments.

8. Set up and sum the geometric series for each of the following:

$$(a)\ R^{(m)}s^{(p)}_{\overline{n}|j};\quad (b)\ s^{(p)}_{\overline{n}|i};\quad (c)\ R^{(m)}a_{\overline{n}|j}.$$

Show in detail the steps by which each of the fractional forms thus obtained may be reduced to the corresponding tabulated forms.

9. A fruit farm yields on the average $8,000 every third year. If money is worth 6% effective, find the cash value of the income for the next 30 years, the first income being 3 years hence. *Ans.* $34,589.35.

10. A thrifty youngster receives a $1.50 weekly allowance. He makes 50 cents a week satisfy his needs and places the remainder in a savings account. Find the amount to his credit at the end of 4 years if the savings account credits interest so that he will receive the equivalent (*a*) of 4% effective; (*b*) of (.04, $m=4$).

11. What is the cash value of a suite of furniture for which a buyer pays $50 cash and $20 per month thereafter until a total of $410 has been paid? Money is worth (.03, $m=4$). *Ans.* $401.61.

12. **A** buys bonds which will be redeemed at face value 15 years hence. He receives $5 annual dividends on each $100 invested. If the dividends are allowed to remain with the issuing company, what total amount will **A** receive, per $100, at the end of 15 years if the dividends accumulate (*a*) at (.04, $m=2$)? (*b*) at (.04, $m=4$)? (*c*) at 4% effective?

13. What single sum paid annually at the beginning of each year would equitably replace $20 per month, paid at the end of each month, if money is valued at (.06, $m=2$)? *Ans.* $232.47.

14. Assuming that the annuity formulas hold for all such values of n as $n=\frac{1}{t}$, where t is a positive integer, prove algebraically that $s_{\overline{1/t}|i}=\frac{1}{t}\cdot\frac{1}{s^{(t)}_{\overline{1}|i}}$. Use the result to express $s_{\overline{\frac{1}{4}}|.02}$ in tabular functions and evaluate.

15. A certain bond has attached coupons of $35 each, payable at the end of each 6 months for the next 15 years. What is the present value of these coupons if evaluated at 5%? *Ans.* $735.55.

16. A depreciation fund is being accumulated by semiannual deposits of $800 each in a fund earning (.03, $m=4$). What will be the value of the fund at the end of 12 years?

17. A frame house is painted every second year at a cost of $180. If money is worth $(.05, m = 2)$, what is the present value of keeping the house painted for the next 30 years. *Ans.* $1,339.80.

18. A man pays $30 cash and $30 at the end of each month for a period of 8 years for stock in a certain association which has agreed to allow interest at a rate which will allow the investor to make $(.04, m = 2)$ on his investment. What is the value of the stock immediately after the $30 payment made at the end of the eighth year?

19. Prove the algebraic equality $(1 + i) \cdot a_{\overline{n}|i} = 1 + a_{\overline{n-1}|i}$.

20. The present value of an annuity of P dollars per year, for only one year and made in a single payment at the end of the year, is evidently equivalent to P discounted for one year. Prove this relation algebraically, i.e., $P \cdot a_{\overline{1}|i} = P(1 + i)^{-1}$.

21. A company whose average annual rate of income has been 8.64% offers its employees the privilege of investing in the company. Find to the nearest dollar the value to date of the holdings of an employee who has been investing $25 each month from his salary for the last 8 years. *Ans.* $3,393.

22. A truck-operator can buy a new truck for $4,000 or he can rent a truck for the same purpose for $100 a month. If the rent is paid at the end of the month and money is worth 5%, compounded semiannually, which is the more profitable proposition for the truck-owner, assuming that the truck is valueless at the end of 4 years and that the operator pays the upkeep in either case?

23. A debtor is credited with a payment of $10 at the end of each month. If interest is allowed on all payments at $(.04, m = 2)$, what amount is available for application on the debt at the end of 20 months? *Ans.* $206.41.

24. The purchaser of a house pays $5,000 cash and promises to pay $500 at the end of each 6 months for the next 8 years. If money is worth $(.05, m = 4)$,

a. What is the cash valuation of the house?

b. What payment at the end of 2 years, in addition to the one due at that time, will cancel the remaining liabilities?

c. If the purchaser fails for the first 3 years to make the instalments when due, what payment, in addition to the one due at that time, will bring his payments up to date?

25. An investment of $25,000, producing an income of $750 each 6 months, is left to a 12-year-old child. The child is allowed one half of the income for expenses, while the other half is invested for him at $(.04, m = 2)$. These accumulations, together with the principal invested, become the property of the child on his twenty-first birthday. What is the value of this legacy on that date? *Ans.* $33,029.62.

24. To determine the periodic payment. The formula for the present value of an annuity gives a relation between V_0, R, j, m, n, and p. Similarly, the formula for the amount of an annuity gives a relation between V_n, R, j, m, n, and p. In either case, if we know five of the six quantities denoted by these letters, we should be able to solve for the remaining one. Thus far we have considered only cases in which V_0 or V_n was the unknown. Let us next consider the problem in which R is the unknown.

There is nothing essentially new encountered in setting up this problem; the important consideration, as in most problems involving numerical computation, is that of reducing the equation involved to the simplest form for evaluation. The reciprocal functions $s^{-1}_{\overline{n}|i}$ and $a^{-1}_{\overline{n}|i}$, being tabulated, lend themselves readily to such simplification. The reciprocal of $s^{(p)}_{\overline{1}|i}$ has not been tabulated; hence in problems in which $p > m$ an extra step is necessary in a logarithmic solution unless one wishes to use cologarithms.

Example 1. A house was sold for \$17,500. The buyer paid \$6,000 cash and the remainder in 24 equal semiannual payments, the first one 6 months after date of purchase. Find the amount of each of these payments if they also provide for interest on the outstanding debt at $(.05,\ m = 4)$.

Solution. The cash payment of \$6,000 leaves \$11,500 yet to be paid. The, annuity equation and its solution follow:

$$11{,}500 = R \cdot {}^{(4)}a^{(2)}_{\overline{12}|.05}.$$

$$\frac{R}{2} = 11{,}500\, a^{-1}_{\overline{48}|.0125} \times s_{\overline{2}|.0125}.$$

$$\log \frac{R}{2} = 4.0606978 + 8.4445249 - 10 + .3037359 = 2.8089586.$$

$$\frac{R}{2} = \$644.11.$$

Example 2. What sum must a company set aside each month, if accumulated at $(.03,\ m = 4)$, in order to provide a depreciation fund of \$15,000 at the end of 15 years?

Solution. Of the different final forms in which the solution might be expressed, the following is probably preferable:

$$R \cdot {}^{(4)}s^{(12)}_{\overline{15}|.03} = 15{,}000.$$

$$\frac{R}{12} = \frac{5000}{s_{\overline{60}|.0075} \cdot s^{(3)}_{\overline{1}|.0075}}.$$

$$\log \frac{R}{12} = 3.6989700 - 1.8775104 - .0010826 = 1.8203770.$$

$$\frac{R}{12} = \$66.13.$$

EXERCISES

1. A corporation must provide \$100,000 for the retirement of bonds 15 years hence. What sum must be set aside annually for this purpose if the fund allows interest at $(.05,\ m = 2)$? *Ans.* \$4,612.47.

2. A boy will be 16 years of age on his next birthday. He desires to establish a business of his own when he becomes 25. The boy's father encourages him by offering to invest for him on each successive birthday, 16th to 25th inclusive, funds sufficient to provide \$10,000. If these annual investments earn $(.04,\ m = 4)$, what is the annual cost to the father?

3. A family is left \$15,000 from insurance. If the insurance company allows $3\frac{1}{2}\%$ on money held for beneficiaries, what monthly payments will the insurance provide for a period of 12 years? *Ans.* \$127.33.

4. A student entering college is given \$4,500. What quarterly withdrawals for the following 4 years will this sum provide if the money is invested at $3\frac{1}{2}\%$, compounded quarterly?

5. A is paying \$1,000 at the end of each year on a certain obligation. What equal monthly payments will equitably replace this annual payment if money is worth 6%? *Ans.* \$81.13.

6. By what semiannual payment may a creditor equitably replace monthly payments of \$50 each if interest is computed at the rate of $(.06, m = 12)$?

7. A couple have saved up \$4,500 to finance a vacation. The money is in a fund allowing $(.03, m = 12)$. They are to start on the trip in 30 days and be gone for 18 months. What equal amounts may they withdraw at the beginning of each month while away if they plan to use the entire sum for this purpose? *Ans.* \$255.98.

25. To determine the number of payments. In order to determine the number of annuity payments necessary to produce a certain amount (or of which a certain sum is the present value), it is necessary to solve the annuity equation for n. The procedure is illustrated in the following example:

Example. An \$8,500 mortgage, bearing interest at 6%, is to be paid off by semiannual payments of \$450 each, the payments, including principal and interest, continuing as long as necessary to extinguish the debt. Determine the number of payments which are necessary.

Solution. The annuity equation involving the unknown, n, with its solution by interpolation, follows:

$$900 \cdot a^{(2)}_{\overline{n}|.06} = 8500.$$

$$a_{\overline{n}|.06} = \frac{85}{9 \cdot s^{(2)}_{\overline{1}|.06}}.$$

$$\begin{aligned}\log a_{\overline{n}|.06} &= \log 85 + \text{colog } 9 + \text{colog } s^{(2)}_{\overline{1}|.06}\\ &= 1.9294189 + 9.0457575 - 10 + 9.9936275 - 10 = .9688039.\end{aligned}$$

$$\therefore n = 14.03.$$

Hence the number of payment periods is $pn = 28.06$.

Although the steps of the above solution are readily followed, some interpretation is necessary. Algebraically the solution presents no difficulties, but, owing to the fact that an annuity has thus far been defined only for an integral number of payment periods, pn, a question arises as to the interpretation of nonintegral values. The use to be made of this fractional period will be discussed in more detail in a later chapter (see Sections 35 and 64), but, in general, the meaning of a nonintegral solution is fairly obvious. As in this example, since $pn = 28$ plus a fraction, it is obviously necessary to make 28 full payments, of $450 each, plus some additional partial payment. The amount of this partial payment will, of course, vary according as it is made at the time of the last full payment, or at the next regular payment date, or at the end of the fractional part of the period indicated by the solution.

The amount necessary to conclude a final settlement on any regular date is readily found by evaluating all payments and all debts on the particular date in question.

From the nature of the problem, accuracy to two decimal places in the value of n, as found by interpolation, is quite sufficient in most cases. A more accurate result can be obtained, if needed, by the method illustrated in the logarithmic solution of the problem presented above; thus:

$$450 \times \frac{1-(1.06)^{-n}}{(1.06)^{\frac{1}{2}}-1} = 8500.$$

$$(1.06)^{-n} = 1 - \tfrac{170}{9}\left[(1.06)^{\frac{1}{2}} - 1\right] = .44158740.$$

$$n = \frac{-\log .44158740}{\log 1.06} = \frac{.3549833}{.0253059} = 14.0278 \text{ (years)}.$$

$$\therefore 2n = 28.0556 \text{ (payments)}.$$

If the rate or the value of n involved in a given problem were not tabulated, then the above logarithmic procedure would, of necessity, be the method to use.

EXERCISES

1. An individual purchases a piece of real estate for $15,000 on contract. The terms of the contract are $7,000 cash and $150 per month as long as necessary to pay the remaining indebtedness with interest at 6%, compounded semiannually. How many full payments are necessary to reduce the indebtedness to less than $150? *Ans.* 62.

2. Solve the following equations for n, by interpolation when possible, giving the results to two decimal places in each case.

(*a*) $s_{\overline{n}|.02} = 65.4132.$ (*d*) $a_{\overline{n}|.06} = 16.000000.$

(*b*) $1000 \cdot {}^{(2)}s^{(4)}_{\overline{n}|.04} = 9000.$ (*e*) $600^{(12)}a_{\overline{n}|.06} = 7000.$

(*c*) $s_{\overline{n}|.032} = 15.2437.$ (*f*) $a_{\overline{n}|.047} = 8.9421.$

3. A trust fund of $15,000 is to provide a quarterly income of $500 until the fund is exhausted. If the fund is invested at (.045, $m = 2$), (*a*) how many full payments of $500 each will be made, (*b*) if, when the fund has been depleted to less than $500, the balance is paid out at the time of the last full payment, what will be the total amount paid out on that date? *Ans.* (*a*) 36, (*b*) $873.59.

4. The sum of $12,500 invested in an enterprise which allows interest at (.06, $m = 12$) is left to an heir. The heir is to withdraw $1000 annually until the amount remaining is insufficient for two more full payments and is therefore withdrawn in a single sum. What is the amount of the final withdrawal?

26. To determine the interest rate. The determination of the interest rate is a very important problem. For example, if payment for an article is made by a small cash payment, and the remainder by a succession of equal periodic payments, the buyer should be able to determine what rate of interest this method of payment is costing him. Again, if one receives a loan and repays it by small monthly payments, a practice met daily in loan service, then he should be able to compute the interest rate which is involved in the transaction. A comparison of safe investments is largely a matter of accurate determination of interest rates.

The experience with annuities gained thus far should make the annuity equation fairly easy to set up, but, in the general case, it is not so easily solved when the rate is the unknown quantity. Consider the following example:

Example. The remaining indebtedness on a piece of property, on which the owner has been making monthly payments of \$8.17 for a period of years, is \$228.96. There are just 30 payments remaining to be made. Assuming that the interest rate has been constant throughout the liquidation of the debt, what nominal rate (j, $m = 2$) has the borrower been paying on his indebtedness?

Solution. When the equation is set up and simplified to tabulated functions in the usual way, we have

$$12(8.17) \times {}^{(2)}a^{(12)}_{\overline{2\frac{1}{2}}|j} = 228.96,$$

or

$$a_{\overline{5}|j/2} \cdot s^{(6)}_{\overline{1}|j/2} = 4.6707.$$

This equation, however, is not adapted to interpolation in this form since the unknown rate occurs in each of the factors involved in the left member of the equation. This difficulty will always arise in case $m \neq p$. This suggests that we first (*a*) *find the nominal rate for the conversion rate equal in length to that of the payment interval,* and then (*b*) *from this rate find the nominal rate corresponding to the conversion interval desired.* (See formula [13], page 19.) For the above problem we therefore have, from (*a*) (i.e., making $m = 12$),

$$12(8.17) \cdot {}^{(12)}a^{(12)}_{\overline{2\frac{1}{2}}|j} = 228.96.$$

$$a_{\overline{30}|j/12} = 28.02448.$$

$$\therefore \frac{j}{12} = \frac{5}{12}\% + \frac{1212}{3516} \times \frac{1}{12}\% = .00445.$$

By the statement in (*b*) we can now find the equivalent rate for $m = 2$; thus,

$$\left(1 + \frac{j}{2}\right)^2 = (1 + .00445)^{12};$$

$$j = .0540, \qquad m = 2. \quad \textit{Ans.}$$

Although the last digit in the answer just given is not absolutely reliable, the accuracy demonstrated is usually quite sufficient. If further accuracy is necessary, successive interpolations, giving *two additional digits* with each interpolation, may be carried out in a similar way. Such an extension is limited only by the tables at one's disposal. In the illustrative example above, the rate $j/12$ was between .00445 and .00446. By the use of logarithms the values of $a_{\overline{30}|.00445}$ and $a_{\overline{30}|.00446}$ are calculated from the forms $\frac{1-(1.00445)^{-30}}{.00445}$ and $\frac{1-(1.00446)^{-30}}{.00446}$ and found to be 28.0255 and 28.0212 respectively. The interpolation for the next two digits is then readily made, as indicated in the following table:

$\frac{j}{12}$	$a_{\overline{30}|j/12}$
.00445	28.0255
_ _ ? _ _	28.0245
.00446	28.0212

$$\therefore \frac{j}{12} = .00445 + \frac{10}{43} \times .00001 = .0044500.$$

As in part (*b*) above, the corresponding value of j for $m = 2$ is found to be .054000.

Especially in determining the yield rate for transactions involving large sums, such as the bid on a large volume of bonds, it is often desirable to find the rate to an even greater number of decimal places. This will be taken up in a later chapter.

In case the payment interval and the conversion interval are the same (i.e., $m = p$), then part (*b*) in the example above would, of course, not be necessary.

EXERCISES

1. The cash price of a household appliance is $155. It can be bought for $15.50 cash and $12.88 per month for 12 months.

a. What is the maximum rate (j, $m = 12$) at which the buyer can afford to borrow the money in order to pay cash?

b. To what nominal rate, compounded semiannually, is this equivalent? *Ans. a,* 19.37%; *b,* 20.11%.

2. A trust company offers to pay $250 per month for the next 8 years to the dependents of an investor in return for an immediate deposit of $21,000. Comparing this with his other investments on which interest payments are made semiannually, what rate (j, $m = 2$) may the investor consider that this investment is making?

3. A "small loan" company advertises small loans to householders, allowing such loans to be repaid, with interest, in 10 equal monthly payments, each payment being one tenth of the loan plus one half of one per cent of the loan as interest. A borrows $300 on this plan.

a. What nominal rate (j, $m = 12$) is A having to pay?

b. What is the equivalent effective rate? *Ans. a,* 10.76%; *b,* 11.35%.

4. The cash price of a standard make of portable typewriter is $60. The typewriters are sold on terms of $12.50 cash and $10 per month for the following 5 months. What nominal rate of interest, compounded quarterly, is it costing the purchaser who buys his typewriter on this basis?

5. A debt of \$2,500 is repaid by four equal annual payments of \$700 each. Determine to six decimal places the effective rate being charged on the debt. *Ans.* .046925.

6. A corporation sets aside \$1,000 semiannually to retire an indebtedness of \$75,000 at the end of 15 years. On this basis, at what rate $(j, m = 2)$ must this account be credited on the books of the company?

7. A motor corporation sells cars for P dollars, 40% of which must be paid in cash. The unpaid balance plus 8% of this balance is divided into equal monthly payments to be made for the following 15 months. What effective rate of interest is one actually paying when buying on this plan? *Ans.* 12.41%.

8. A company having money to loan on well-secured mortgages advertises to loan money for 5%. The specific figures, submitted to a prospective client by a company representative, on two optional methods of repaying such a loan are (1) monthly payments of \$7.91 per \$1,000 for a period of 15 years or (2) quarterly payments of \$23.78 (explained by the company representative as $.05 + 3(7.91)$) per \$1,000 for a period of 15 years. Find the nominal rate, compounded monthly, for each of the optional methods (1) and (2), and thus determine the truth or falsity of the statements that the two offers are equivalent and that the loans are being made at 5%.

9. The 14th edition of an encyclopedia was offered with three optional methods of settlement: (a) \$129.50 cash, (b) \$5 cash and 15 consecutive monthly payments of \$9.10 each, and (c) \$5 cash and 8 consecutive monthly payments of \$16.30 each. A later advertisement announced a reduction in each of the above quotations, the new prices being listed as: (A) \$99.50 cash, (B) \$5 cash and 15 consecutive monthly payments of \$6.95 each, and (C) \$5 cash and 8 consecutive monthly payments of \$12.40 each. Ascertain the difference in financing rates to the purchaser resulting from the reduction of the corresponding sales prices by finding, in each of the four cases, the nominal rate of interest, compounded monthly, which the buyer pays for the privilege of paying on the instalment plan. *Ans.* (b) 14.08%, (c) 12.48%, (B) 15.04%, (C) 13.08%.

10. The following is a quotation from a finance corporation's advertisement.

GET A \$100 LOAN

Repay \$6.43 a month. Payments include $2\frac{1}{2}\%$ per month, which is less than the legal rate.

Guaranteed Payment Table

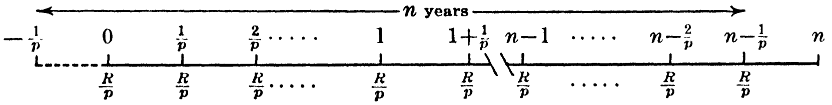
LOAN	AMOUNT YOU PAY BACK EACH MONTH, INCLUDING ALL CHARGES			
	6-Months Loan	12-Months Loan	16-Months Loan	20-Months Loan
\$100	\$18.18	9.77	7.68	6.43

Nothing else to pay

a. Determine if the rates for the different durations indicated in the table are essentially the same.

b. Using the monthly payment for 12 months, find correct to four decimal places the nominal rate, compounded monthly.

27. The annuity due. Again, let us consider payments of P dollars per year, paid in p payments per year for a period of n years, evaluated at a nominal rate j, converted m times per year. Let the payments be pictured as shown in the following diagram, the notation as to time being purely a matter of convenience.



From the definitions in the early part of this chapter (Section 19) the $p \cdot n$ payments constitute an ordinary annuity (annuity immediate) or an annuity due, depending upon whether we consider them as being made at the end of the $p \cdot n$ intervals over the period of n years, beginning according to the above scale at time $-\frac{1}{p}$ and ending at time $n-\frac{1}{p}$, or whether we consider them as being made at the beginning of the $p \cdot n$ intervals over the n years beginning at time 0 and ending at time n, as pictured in the diagram. Denoting the total values of these payments at 0 and $-\frac{1}{p}$ as V_0 and $V_{-\frac{1}{p}}$ respectively, there is the obvious relation

$$V_0 = \left(1 + \frac{j}{m}\right)^{m \cdot \frac{1}{p}} \cdot V_{-\frac{1}{p}}.$$

But $V_{-\frac{1}{p}}$, the value of the payments at $-\frac{1}{p}$, is the *present value of the ordinary annuity*, $R \cdot {}^{(m)}a_{\overline{n}|j}^{(p)}$. Likewise V_0, the *sum of the evaluations at 0*, is the *present value of the annuity due*, which we shall *designate by the symbol* $R^{(m)}\mathbf{a}_{\overline{n}|j}^{(p)}$.* Hence we have the relation

$$[36] \qquad R \cdot {}^{(m)}\mathbf{a}_{\overline{n}|j}^{(p)} = \left(1 + \frac{j}{m}\right)^{m/p} \cdot R \cdot {}^{(m)}a_{\overline{n}|j}^{(p)}.$$

Similarly, $V_{n-\frac{1}{p}}$, the value of the payments over the n years from the time $-\frac{1}{p}$ to $n-\frac{1}{p}$, evaluated at $n-\frac{1}{p}$, is the *amount of the annuity immediate*, $R \cdot {}^{(m)}s_{\overline{n}|j}^{(p)}$, while V_n, the sum of the evaluations at n of the payments over the n years from 0 to n, is the *amount of the annuity due*, which we shall designate by the symbol $R \cdot {}^{(m)}\mathbf{s}_{\overline{n}|j}^{(p)}$.** Here again, since, as is obvious from the diagram,

---

* Read "a due," etc.

** Read "s due," etc.

$$V_n = \left(1+\frac{j}{m}\right)^{m\cdot\frac{1}{p}}\cdot V_{n-\frac{1}{p}}$$

it is possible to write the results of the amount of the annuity due in terms of the ordinary annuity as

[37] $$R\cdot {}^{(m)}\$^{(p)}_{\overline{n}|j} = \left(1+\frac{j}{m}\right)^{m/p}\cdot R\cdot {}^{(m)}s^{(p)}_{\overline{n}|j}.$$

Both of the results of this paragraph may be combined into a single statement, as follows:

Theorem 2. *The value of an annuity due is always equal to the value of the corresponding annuity immediate, accumulated for one payment interval.*

These formulas make it possible for any problem interpreted as an annuity due to be evaluated directly in terms of tabulated functions with which we are already familiar. It may be noted that available tables do not tabulate $\mathrm{a}_{\overline{n}|i}$ or $\$_{\overline{n}|i}$.

The reader should note the remark made at the beginning of the discussion of the annuity due, namely, "the notation as to time is purely a matter of convenience"; the point emphasized is that it is, in the main, immaterial whether we consider the first payment as being *made at the beginning of the period*, 0 to $\frac{1}{p}$, or as being *made at the end of the period*, $-\frac{1}{p}$ to 0. The essential thing to have clearly in mind is that $R^{(m)}\mathrm{a}^{(p)}_{\overline{n}|j}$ and $R^{(m)}a^{(p)}_{\overline{n}|j}$ give the value of the $p\cdot n$ payments *at the time of the first payment and at one payment period before the first payment respectively.* Similarly, $R^{(m)}s^{(p)}_{\overline{n}|j}$ and $R^{(m)}\$^{(p)}_{\overline{n}|j}$ evaluate the payments *at the time of the last payment and at one payment period beyond the last payment respectively.* If one is absolutely clear on these points, he should find few difficulties in handling annuities.

NOTE. The notation adopted above has again been chosen to conform to that of Glover's tables. The "script *a*" distinguishes the present value of the annuity immediate from that of the annuity due, which is symbolized by the "printed a." The amount of the annuity immediate and the amount of the annuity due are differentiated by using a plain italic *s* for the former and the same letter with a line through it, $\$$, for the latter. Thus it is necessary to use the letters with discretion, since the different forms of any one letter (for instance, *a*, a, and *A*) have quite different meanings.

EXERCISES

1. Diagram and interpret by a detailed verbal statement the meaning of each of the following symbols:

(*a*) $1000\cdot {}^{(4)}\mathrm{a}^{(2)}_{\overline{10}|.04}$.

(*b*) $800\cdot {}^{(2)}\$^{(2)}_{\overline{8}|.05}$.

(*c*) $1200\cdot {}^{(4)}\mathrm{a}^{(12)}_{\overline{5}|.06}$.

(*d*) $4000\cdot {}^{(2)}\mathrm{a}_{\overline{6}|.04}$.

(*e*) $500\cdot \$^{(4)}_{\overline{10}|.06}$.

(*f*) $1500\cdot {}^{(4)}\$^{(\frac{1}{2})}_{\overline{12}|.04}$.

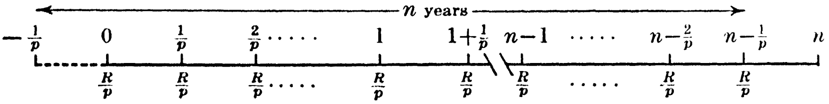
2. With the aid of formulas [36] and [37], express each of the parts of Ex. 1 in terms of tabular functions.

3. Diagram and interpret each of the following:

(a) $\mathbf{a}_{\overline{11}|.03} - 1.$ (c) $\$_{\overline{10}|.05} + 1.$

(b) $100 \cdot \mathbf{a}^{(4)}_{\overline{5}|.03} - 25.$ (d) $6000 \cdot {}^{(4)}\$^{(12)}_{\overline{10}|.04} + 500.$

Other useful algebraic relations may be set up between the annuity due and the annuity immediate. For convenient reference we repeat here the diagram given on page 54.



Since the value of the first payment of $\frac{R}{p}$ evaluated at 0 is simply $\frac{R}{p}$, and the remaining payments form an ordinary annuity (annuity immediate) for a period of $n - \frac{1}{p}$ years, the annuity period being from 0 to $n - \frac{1}{p}$, we may write down immediately the relation

$$[38] \qquad R \cdot {}^{(m)}\mathbf{a}^{(p)}_{\overline{n}|j} = \frac{R}{p} + R \cdot {}^{(m)}a^{(p)}_{\overline{n - 1/p}|j}.$$

In case $m = p$, and hence the product $m\left(n - \frac{1}{p}\right)$ is an integer, the numerical evaluation is much more simply made with this form than with that suggested by formula [36].

Similarly, the amount of an annuity due may be written in a form more easily evaluated for certain problems. If an additional payment of $\frac{R}{p}$ were placed at n, the value of the payments, covering the period from $-\frac{1}{p}$ to n and evaluated at n, would be given by the symbol $R^{(m)}s^{(p)}_{\overline{n+1/p}|j}$. But this is the value of the annuity due, represented in the diagram, plus the suggested additional payment of $\frac{R}{p}$. The amount of the annuity due is thus readily written as

$$[39] \qquad R \cdot {}^{(m)}\$^{(p)}_{\overline{n}|j} = R \cdot {}^{(m)}s^{(p)}_{\overline{n+1/p}|j} - \frac{R}{p}.$$

When $m = p$, and hence $m\left(n + \frac{1}{p}\right)$ is an integer, the numerical evaluation is here also much simpler, in general, than that suggested by formula [37].

If in an annuity equation the annuity is an annuity due and the unknown to be determined is j, then formulas [38] and [39] should always be used, since it would be difficult to interpolate when the unknown occurs in two different factors, as would be the case if formulas [36] and [37] were used.

Example 1. To care for the family of an injured worker, a company is ordered to set aside a sum sufficient to provide \$75 per month for the next 15 years, the first payment to be made immediately. If this sum is placed with a trust company which allows interest at (.03, $m = 2$), what amount must be set aside?

Solution. The payments form an annuity due of annual rent 12(75), or \$900 for a period of 15 years; hence

$$900 \cdot {}^{(2)}\mathrm{a}^{(12)}_{\overline{15}|.03} = 450\, a_{\overline{30}|.015} \times s^{(6)}_{\overline{1}|.015} \times (1.015)^{\frac{1}{6}}.$$

$$\log 900 \cdot {}^{(2)}\mathrm{a}^{(12)}_{\overline{15}|.03} = 2.6532125 + 1.3804978 + .0026981 + .0010777 = 4.0374861.$$

$$\therefore V_0 = \$10{,}901.50.$$

Example 2. A student borrows \$200 at the beginning of each three months during his 7 years of college and professional training. If he has obtained these loans at (.035, $m = 4$), what is the debt at the end of 7 years?

Solution. The solution will be given by two methods.

(1) *By formula [37]* we have

$$800 \cdot {}^{(4)}\ddot{s}^{(4)}_{\overline{7}|.035} = 200 \cdot s_{\overline{28}|.00875} \times (1.00875).$$

$$\log 800 \cdot {}^{(4)}\ddot{s}^{(4)}_{\overline{7}|.035} = 2.3010300 + 1.4993107 + .0037835 = 3.8041242.$$

$$\therefore V_7 = \$6{,}369.78.$$

(2) *By formula [39]* the solution follows readily without the use of logarithms.

$$\begin{aligned} 800\,{}^{(4)}\ddot{s}^{(4)}_{\overline{7}|.035} &= 200\, s_{\overline{29}|.00875} - 200 \\ &= 200(32.84889189) - 200. \end{aligned}$$

$$\therefore V_7 = \$6{,}369.78.$$

EXERCISES

1. A cash payment of \$40 and a like amount at the beginning of each month for the following 59 months will pay for a lot in a new city subdivision. If money is worth (.05, $m = 4$), what is the cash value of the property? *Ans.* \$2,129.49.

2. From its membership dues, collected at the beginning of each quarter, an association deposits \$200 in a reserve fund which credits interest at (.05, $m = 4$). What amount does the association have to its credit at the end of 7 years?

3. Prove that $R \cdot {}^{(m)}\mathrm{a}^{(p)}_{\overline{n}|j}$, where $\frac{m}{p} = k$ is an integer, may be expressed as $R \cdot {}^{(m)}\mathrm{a}^{(p)}_{\overline{n}|j} = \frac{R}{p} \cdot a_{\overline{mn}|j/m} \cdot a^{-1}_{\overline{k}|j/m}$. Check the solution of Ex. 1 by the use of this formula.

4. Prove that $R \cdot {}^{(m)}s^{(p)}_{\overline{n|}j}$, where $\dfrac{m}{p} = k$ is an integer, may be expressed as $R \cdot {}^{(m)}s^{(p)}_{\overline{n|}j} = \dfrac{R}{p} \cdot s_{\overline{mn|}j/m} \cdot a^{-1}_{\overline{k|}j/m}$. Check the solution of Ex. 2 by the use of this formula.

5. A pays a premium of $187.16 at the beginning of each policy year on a 30-year-endowment insurance policy. At the end of the 30 years he is alive, and the insurance company pays him $10,000, the face of the policy.

a. Had the policy-holder deposited the annual premiums of $187.16 in a bank paying $3\frac{1}{2}\%$ interest, how much more (or less) would he have received at the end of the 30 years?

b. The cash values of his insurance at the end of 10 years, 16 years, and 25 years are $2,160, $3,900, and $7,340 respectively. Compare these amounts with the corresponding amounts he would have received on these respective dates had the premium payments been invested at $3\frac{1}{2}\%$.

Ans. a, – $.14; *b,* – $112.50, – $162.31, – $205.00.

6. A social agency wishes to find a donor who is willing to finance a research project. It is estimated that $300 a month for the next 5 years will be necessary. If the money is to be made available at the beginning of each month and the unused balance remains at interest at (.04, $m = 2$), what amount is asked of the donor?

7. By setting up and summing the geometric series derive the two forms for $R \cdot {}^{(m)}a^{(p)}_{\overline{n|}j}$ given by formulas [36] and [38]. In the same way derive the forms [37] and [39] for $R \cdot {}^{(m)}s^{(p)}_{\overline{n|}j}$.

8. An investment of $15,000 is left to a family. It is stipulated that this is to provide $800 at the beginning of each 6 months for the next 12 years. What interest rate (j, $m = 4$) is the investment company allowing on the money which has been left in its care?

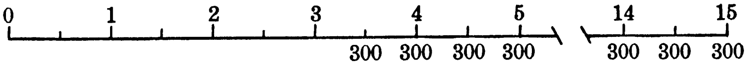
9. A father opened a savings account for his daughter at her birth with a deposit of $50. On each successive birthday a like deposit was made. Immediately after the deposit on her 18th birthday the value of the account was $1,253.65. At what interest rate (j, $m = 4$) has the interest been accumulating? *Ans.* 2.95%.

10. A company has to pay $876.42 every third year as premium on a fire-insurance policy. In order to distribute the expense, the company wishes to set aside at the beginning of each quarter a sum sufficient to provide for this triennial payment when it becomes due. What is the quarterly sum necessary if these sums are credited with interest at 4%, compounded quarterly?

11. In Ex. 5, above, if the policy-holder had terminated his insurance at the end of 16 years, at what rate of interest (thinking of the premium payments solely as an investment) could he consider that his payments had accumulated? Answer the same question for 25 years and for 30 years. *Ans.* 3.04%; 3.30%; 3.50%.

12. A salaried worker decides to begin today to set aside $75 each month, looking forward to going into business as soon as he has accumulated $7,500. If his deposits are invested at (.05, $m = 2$), how long will it be before he can start a business of his own?

28. Deferred annuities. It is not uncommon that a contract provides equal periodic payments, the first to be made at some future specified date quite beyond a single payment period. For instance, a newly organized company issuing bonds might prefer to defer the payment of dividends until its product has established itself on the market. In particular, if bonds of face value \$10,000 provide semiannual dividends of \$300, the first at $3\frac{1}{2}$ years and the last at 15 years from the date of issue, then they may be pictured thus:



There are semiannual payments of \$300 covering the period of 12 years. From previous definitions, it is evident from the diagram that the payments may be interpreted either as an ordinary annuity for 12 years, beginning at 3 years and ending at 15 years, or an annuity due beginning at $3\frac{1}{2}$ years and ending at $15\frac{1}{2}$ years. If, then, it is desired to find the present value of these \$300 payments at (.05, $m = 2$), this may be done either by discounting the ordinary annuity for 3 years or by discounting the annuity due for $3\frac{1}{2}$ years. As the symbol for a deferred annuity we shall use the vertical bar preceded by the number designating the period of deferment; then we have

$$600 \cdot {}_{3\frac{1}{2}}|{}^{(2)}\ddot{a}^{(2)}_{\overline{12}|.05} = 600 \cdot {}_{3}|{}^{(2)}a^{(2)}_{\overline{12}|.05} = 300 \cdot a_{\overline{24}|.025} \cdot (1.025)^{-6}.$$

In general, if the first payment is $n' + \frac{1}{p}$ years hence, then the present value of an n-year ordinary annuity which is *deferred* $\boldsymbol{n'}$ *years,* called the *deferred annuity,* is given by

$$\textbf{[40]} \qquad R \cdot {}_{n'}|{}^{(m)}a^{(p)}_{\overline{n}|j} = R \cdot {}^{(m)}a^{(p)}_{\overline{n}|j} \cdot \left(1 + \frac{j}{m}\right)^{-mn'} \cdot$$

A second method of evaluating such an annuity is also suggested by the diagram. The value of the annuity $R^{(m)}a^{(p)}_{\overline{n'+n}|j}$ would contain the annuity $R^{(m)}a^{p}_{\overline{n'}|j}$, which must be deleted in order to have the present value of *only* the payments of the deferred annuity. Hence

$$\textbf{[41]} \qquad R \cdot {}_{n'}|{}^{(m)}a^{(p)}_{\overline{n}|j} = R \cdot {}^{(m)}a^{(p)}_{\overline{n'+n}|j} - R \cdot {}^{(m)}a^{(p)}_{\overline{n'}|j}.$$

In many problems this form is much simpler for numerical computation.

Since only the annuity immediate, $a_{\overline{n}|i}$, is tabulated, it is obviously expedient to set up the ordinary deferred annuity instead of the deferred annuity due.

The accumulated value of the deferred annuity is in no way dependent upon the deferred period n'; hence no special notation is necessary for its symbolic representation.

An annuity for which the *evaluation* is made at some future date *n″ years after* the time of the *last payment* is called a *forborne annuity*. However, its importance in financial mathematics, involving only annuities certain, has thus far not justified a special symbol of identification. Such an evaluation can be readily made in terms of the ordinary annuity and accumulation factors.

EXERCISES

1. A is now 50 years of age. What amount invested immediately at 5%, compounded semiannually, will provide for a semiannual income of $1,500 from age 60 to age 75, including payments at each of these birthday dates? *Ans.* $20,075.13.

2. A minor now 18 years of age is to receive $5,000 in cash when he becomes of age and $200 at the end of each month for the 5 years thereafter. His guardian is given the permission to borrow the present value of this income and buy a partnership in a business for the minor. If the money is evaluated at an interest rate of (.04, $m = 4$), what amount may be borrowed?

3. Prove algebraically that formulas [40] and [41] are equivalent; that is,

$$R \cdot {}^{(m)}a^{(p)}_{\overline{n}|j} \cdot \left(1 + \frac{j}{m}\right)^{-mn'} = R \cdot {}^{(m)}a^{(p)}_{\overline{n'+n}|j} - R \cdot {}^{(m)}a^{(p)}_{\overline{n'}|j}.$$

4. A dairyman estimates that a 6-weeks-old calf will, in 2½ years, produce on the average a net income of $2.50 at the end of each week for the following 5 years and have a sale value of $90 at the end of that time. On this basis, if money is worth (.04, $m = 4$), what price could he pay for the calf without sustaining any loss?

5. It is estimated that a new bridge must be reconditioned at a cost of $3,600 at the end of 5 years and every third year thereafter for a period of 20 years from the time of the building. If the last reconditioning provided for is on the 20th year and money is worth (.04, $m = 2$), what amount set aside now will provide for this upkeep? *Ans.* $13,438.54.

6. A business concern borrows $15,000 and agrees to repay the loan, with interest at (.045, $m = 4$), by quarterly payments of $500 each, the first payment to be made 3 years from the date of the loan. How many full payments of $500 will be necessary?

7. What are the conditions for which formulas [34], [36], and [38] become, respectively, special cases of formula [41]? Prove your statement algebraically.

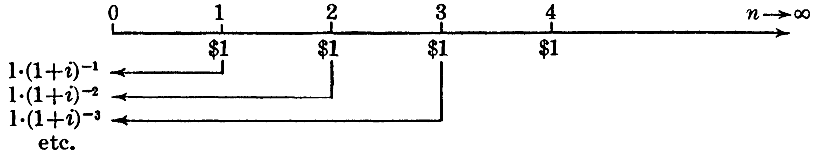
8. Set up and sum the geometric series, and from this sum deduce formulas [40] and [41].

9. To obtain a piece of property, business associates assume the following obligations: beginning 2 years hence, 10 annual payments of $1,000 each, followed by 5 annual payments of $2,500 each. If money is worth 5%, what cash sum should pay for the property? *Ans.* $13,682.42.

10. A receives a legacy from which he decides to set aside a sum sufficient to provide his only child with money for 5 years of technical college training. The child will be ready for college in 6 years. It is decided to provide for $125 at the beginning of each 6 months for tuition, and $200 at the beginning of each quarter for incidentals. If the money can be invested now at (.04, $m = 4$), how much of the legacy will be required for these anticipated expenses?

29. Perpetuities and capitalized cost. One remaining type of annuity of very great importance is that in which the *periodic payments* are thought of as *continuing indefinitely*; such an annuity is called a *perpetuity*. A typical problem is that of an endowment which provides a fixed periodic income indefinitely. Aside from its mathematical aspects, it is obvious that the accumulated value (the amount) of such an annuity need not be considered.

In order to find the present value of a perpetuity, first recall the form which the general annuity formulas for present value take when n is finite. When each of the formulas [34], [36], [38], [40], and [41] is broken up into tabulated functions for numerical computation, the only factor involving n is the factor $a_{\overline{mn}|j/m}$, which is of the general form $a_{\overline{n}|i}$. If, then, n becomes infinite, it is only necessary to evaluate the following infinite series in order to be able to evaluate a perpetuity.



Recalling that the sum of an infinite geometric series in which r is less than unity is found from the relation $S = \frac{a}{1-r}$, we have, on denoting S by the symbol $a_{\overline{\infty}|i}$,

$$a_{\overline{\infty}|i} = \frac{(1+i)^{-1}}{1-(1+i)^{-1}},$$

which, when both numerator and denominator are multiplied by $(1+i)$, reduces to the very simple form

[42] $$a_{\overline{\infty}|i} = \frac{1}{i}.$$

If to the present value of the *periodic costs*, extending *indefinitely*, is *added the original cost*, the sum is defined as the *capitalized cost*.

In the evaluation of perpetuities it is necessary to keep in mind that both infinity plus a constant and infinity times a constant (different from zero) are considered as infinity.

Example. A manufacturing concern has to replace certain tools every 6 months. The original cost of the tools is $2,000, with subsequent replacements less trade-in value estimated at $1,800. If the plant is to be in continuous operation, find the capitalized cost of the tools, assuming money to be worth (.04, $m = 4$).

Solution. Denoting the capitalized cost by the letters c.c., we have, with the usual notation, except that n is infinite,

$$\begin{aligned} \text{c.c.} &= \$2{,}000 + 3600 \cdot {}^{(4)}a^{(2)}_{\overline{\infty}|.04} \\ &= 2{,}000 + 1800 \times \frac{1}{.01} \times s^{-1}_{\overline{2}|.01} \\ &= \$91{,}552.23. \end{aligned}$$

EXERCISES

1. A generous alumnus wishes to make a gift which will provide a semiannual scholarship of \$500 indefinitely. If the first scholarship is to be made available immediately and money can be invested at (.06, $m = 2$), what must be the amount of the bequest? *Ans.* \$17,166.67.

2. Compare the values (*a*) $600 \cdot {}^{(2)}a^{(12)}_{\overline{100}|.0225}$ and (*b*) $600 \cdot {}^{(2)}a^{(12)}_{\overline{\infty}|.0225}$.

3. A churchman wishes to bequeath to his church an amount sufficient to provide \$250 each year indefinitely. If the fund can be left with a trust company allowing (.04, $m = 2$), for what sum must the bequest be made if the first payment is to be made one year after his death? *Ans.* \$6,188.12.

4. It is estimated that a certain piece of farm land will yield an average annual net income of \$2,500 indefinitely. On this basis, what is the maximum price one could afford to pay for the land if he wished to realize 8% on his investment? (This is known as the *capitalized value* of the property.)

5. A stanch politician wishes to set aside a sum sufficient to contribute \$5,000 to the Presidential campaign fund every 4 years. If the first contribution to be provided is 4 years hence and the money can be invested at 5%, what amount must he set aside? *Ans.* \$23,201.18.

6. A manufacturing concern allows 20% in exchange value for an article which costs \$2,500 and must be replaced every 3 years. What is the capitalized cost to a buyer (see Ex. 4, above) if money is worth (.04, $m = 4$)?

7. Funds are to be set aside to provide competent inspection by engineers, 8 years after construction and every 6 years thereafter, of a permanent structure which has just been completed. Assuming that each inspection will cost \$6,500, what sum must be set aside if invested at (.05, $m = 2$)? *Ans.* \$17,074.14.

8. A hospital is left a legacy of \$30,000. The money is invested at 3%, compounded quarterly. What quarterly payments will the legacy provide from now on?

9. A university wishes to set aside money to provide 20,000 examination pads semiannually for its students. If the pads cost 5 cents each, what amount set aside now will provide for pads indefinitely? The university's funds are invested at 5%. *Ans.* \$40,493.90.

10. A gives a cemetery association \$1,800, for which the association promises perpetual upkeep of A's cemetery lot, guaranteeing \$5 per month for this purpose. What effective rate of interest must this money yield to ensure such an expenditure?

11. A donation of \$50,000 is left in trust for the Red Cross. If only the interest is to be used to provide annual contributions of \$3,500, what interest rate (j, $m = 2$) is being allowed on this donation? *Ans.* .06881609.

12. A has \$400 which he will invest at 5% to provide his family with annual subscriptions to good magazines. \$20 per year is spent for this purpose, and the first expenditure is made immediately.

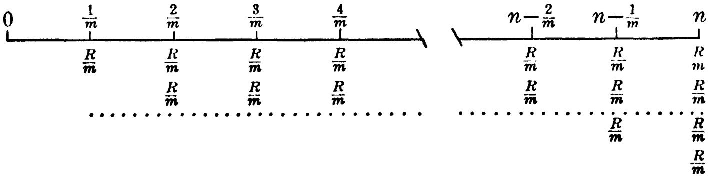
a. For how long a period will the investment provide?

b. What amount added to this \$400 would provide such \$20 payments indefinitely?

13. Show that the difference between the amount which must be invested now at rate i to provide a payment of \$1 annually forever and the amount to provide \$1 annually for n years is $v^n \cdot a_{\overline{\infty}|i}$.

30. Increasing and decreasing annuities. Annuities in which the periodic payments increase or decrease by a constant amount are known as *increasing* and *decreasing annuities* respectively. This type of annuity is similar to one which is probably found more often in the mathematics of insurance.

Consider an annuity in which the payment interval is equal to the conversion interval and in which the payments are $\frac{R}{m}$, $\frac{2R}{m}$, $\frac{3R}{m}$, and so on, increasing by $\frac{R}{m}$ on each payment date, the last payment being $n \cdot R$, i.e., $mn \cdot \frac{R}{m}$. Such annuity payments may be pictured thus:



The amount of this increasing annuity is readily seen from the diagram to be the sum of the mn annuities expressed by the left member of the following equation:

[43]
$$\frac{R}{m}[s_{\overline{mn}|j/m} + s_{\overline{mn-1}|j/m} + s_{\overline{mn-2}|j/m} + \cdots + s_{\overline{2}|j/m} + s_{\overline{1}|j/m}]$$
$$= \frac{R}{j}\left[\left(1 + \frac{j}{m}\right) \cdot s_{\overline{mn}|j/m} - mn\right].$$

The algebraic reduction of the left member of the equation to the form given on the right is accomplished very easily by replacing each annuity symbol by its fractional algebraic form and adding these fractions.

Similarly, the *present value* of an annuity whose initial payment is $n \cdot R$ and decreases by an amount $\frac{R}{m}$ on each of the mn successive payment dates, reversing the diagram above, can be readily written down as

$$\begin{aligned} [44] \qquad & \frac{R}{m}\left[a_{\overline{mn}|j/m} + a_{\overline{mn-1}|j/m} + a_{\overline{mn-2}|j/m} + \cdots + a_{\overline{2}|j/m} + a_{\overline{1}|j/m}\right] \\ & = \frac{R}{j}\left[mn - a_{\overline{mn}|j/m}\right]. \end{aligned}$$

The student should perform the algebraic reduction to the form given on the right in each of formulas [43] and [44], as these are the forms he will use in numerical computation.

The *present value* of the *increasing annuity* described above and the *amount* of the *decreasing annuity* are readily obtained by multiplying the results of [43] and [44] by $\left(1 + \frac{j}{m}\right)^{-mn}$ and $\left(1 + \frac{j}{m}\right)^{mn}$ respectively.

The student will find that one of the best methods for evaluating increasing and decreasing annuities in which $m \neq p$ is to break them up and diagram them as successive ordinary annuities — a procedure similar to that used in developing the formulas above. Addition of the successive annuities can be readily made in most numerical problems, and the procedure is far more enlightening than applying a formula for such cases.

EXERCISES

1. A savings-club membership provides for interest at 3%, compounded monthly, to members making regular monthly contributions. What amount does a member have to his credit at the end of the year if he deposits a dime at the end of the first month, twenty cents at the end of the second month, thirty cents at the end of the third month, and so on throughout the year? *Ans.* $7.87.

2. A can invest money at (.04, $m = 4$). He decides to invest $10 at the end of the first quarter and increase each successive deposit by $10 until his deposit becomes $100, after which all quarterly deposits are to be $100. What is the value of the investment at the end of 5 years?

3. Show that formula [43] may be written as $\frac{R}{j}\left[s_{\overline{mn+1}|j/m} - (mn + 1)\right]$, which is a slightly more convenient form for evaluation in many cases.

4. Todhunter* gives the following convenient formula for the evaluation of increasing and decreasing annuities: $V_0 = p \cdot a_{\overline{n}|i} + q \cdot \frac{a_{\overline{n}|i} - n \cdot v^n}{i}$, where p is the first payment, q the common difference between the successive payments, n the number of payments, and i the rate per payment period. Establish this formula.

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* Ralph Todhunter, *Institute of Actuaries Textbook*, Part I, p. 40. C. & E. Layton, London.

5. A certain project is financed by an annuity which provides a cash payment of $5,000 and quarterly payments thereafter, each payment $250 less than the preceding one. If the money is invested at (.03, $m = 4$), what cash outlay is necessary to provide a total of 20 payments? *Ans.* $50,105.67.

6. Let $(Is)_{\overline{n}|}$ and $(Ia)_{\overline{n}|}$ denote the amount and the present value, respectively, of an increasing (or decreasing) annuity. Show that if p payments a year are made for n years, the first being $\frac{R}{p}$ and each succeeding payment being increased by ΔR, where ΔR may be either positive or negative, with interest computed at (j, m), then the amount and present value are, respectively,

$$(a)\quad R\cdot {}^{(m)}(Is)^{(p)}_{\overline{n}|j}=p\left(\frac{R}{p}-\Delta R\right)\cdot {}^{(m)}s^{(p)}_{\overline{n}|j}+\frac{p\cdot\Delta R}{j}\cdot s^{(p/m)}_{\overline{1}|j/m}\left[\left(1+\frac{j}{m}\right)^{m/p}\cdot p\cdot {}^{(m)}s^{(p)}_{\overline{n}|j} - p\cdot n\right],$$

$$(b)\quad R\cdot {}^{(m)}(Ia)^{(p)}_{\overline{n}|j}=\left(1+\frac{j}{m}\right)^{-mn}\times R\cdot {}^{(m)}(Is)^{(p)}_{\overline{n}|j}\,.$$

7. A company votes to increase its stock by $5,000 at the end of the next dividend date 6 months hence, by $8,000 one year hence, by $11,000 18 months hence, and so on for a period of 3 years. By what total amount will the stock have been increased at the end of this time, interest being added at (.06, $m = 4$)? *Ans.* $79,215.43.

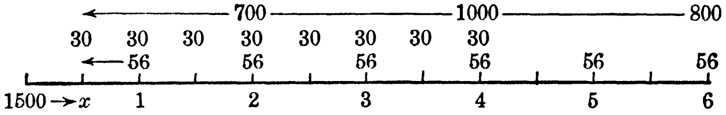
8. A father, realizing that his large family will soon become increasingly self-supporting, wishes to set aside today funds sufficient to provide a semiannual income, beginning with a payment of $5,000 10 years hence and continuing for 15 years, the successive payments decreasing by $150 each. If this money can be invested at (.05, $m = 4$), what sum must be set aside?

31. Further discussion of equations of value and average due date.

In Section 16 attention was called to the fact that most interest-bearing debts require interest to be paid at the end of each conversion period, even though the principal is to be paid in a single sum at some future date. Now that we are able to evaluate periodic interest payments with facility, let us consider problems similar to those of that section on "equations of value" and "average due date," but without the restriction that the interest is accumulated and paid along with the debt. With this change we use essentially the same illustrative examples, with some additions, as were used in the previous discussion.

Example 1. A owes three debts: $700 due at the end of 2 years without interest; $1,000 due in 4 years with interest at 6%, payable semiannually; and $800 due at the end of 6 years with interest at 7%, payable annually. He wishes to pay $1,500 now and the remainder of the indebtedness 6 months hence. If money is worth (.04, $m = 2$), what payment is made at the end of 6 months?

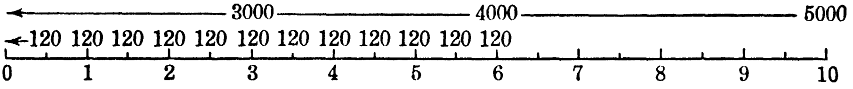
Solution. The diagram now pictures not only the specific debts and repayments but also the periodic interest payments which must be made. The equation of value, with the comparison date at 6 months, is readily written down and evaluated. Thus,



$$1500(1.02)^{1} + x = 700(1.02)^{-3} + 1000(1.02)^{-7} + 800(1.02)^{-11} + 60^{(2)}a_{\overline{4}|}^{(2)}$$
$$+ 56 \times {}^{(2)}a_{\overline{6}|.04} \times (1.02).$$
$$x = \$1,166.80.$$

Example 2. Three debts are to be paid: \$3,000 due in 3 years without interest; \$4,000 due in 6 years with interest at 6%, payable semiannually; and \$5,000 due without interest in 10 years. If money is worth (.05, $m = 2$), (*a*) on what date will a single payment, equal to the maturity value of the three debts, exactly pay off the indebtedness? (*b*) on what date must a \$12,000 note with interest at $3\frac{1}{2}$%, payable semiannually, mature in order to replace equitably the three debts? (*c*) what rate of interest, if paid semiannually, must be charged on a \$9,000 note due in 5 years in order to replace equitably the three debts?

Solution. The set-up for the solution of each of these parts, (*a*), (*b*), and (*c*), is readily seen from a diagram. That part of the diagram common to each of these parts is shown below.



(*a*) $$12000 \cdot (1.025)^{-2n} = 3000(1.025)^{-6} + 4000(1.025)^{-12} + 5000(1.025)^{-20}$$
$$+ 120 \cdot a_{\overline{12}|.025}.$$
$$12000 \cdot (1.025)^{-2n} = 9843.40.$$
$$2n = 8.02.$$
$$n = 4.01.$$

(*b*) $$12000 \cdot (1.025)^{-2n} + 210 \cdot a_{\overline{2n}|.025} = 9843.40.$$
$$12000 \cdot (1.025)^{-2n} + 210 \times \frac{1 - (1.025)^{-2n}}{.025} = 9843.40.$$
$$(12000 - 8400)(1.025)^{-2n} + 8400 = 9843.40.$$
$$(1.025)^{-2n} = .4009.$$
$$2n = 37.02.$$
$$n = 18.51.$$

(*c*) $$9000 \cdot (1.025)^{-10} + 9000 \cdot \frac{j}{2} \cdot a_{\overline{10}|.025} = 9843.40.$$
$$j = \frac{9843.40 - 7030.79}{39,384.29}.$$
$$j = .071415,\ m = 2.$$

It is probably more or less obvious that the *equated date,* as defined earlier in the text, decreases in importance with problems involving durations of any length. The practice followed in paying off a debt maturing on other than a regular payment date is discussed in a later chapter.

EXERCISES

1. A owes a debt of \$2,500 due in 5 years and on which he is paying \$62.50 interest every 6 months. He wishes to have the note for this debt replaced by one made payable 2 years earlier, namely, 3 years hence. A's creditor agrees to this if interest on the new note is made payable semiannually at a nominal rate of 6%. If money is worth (.04, $m = 2$), what should be the face of the new note to replace equitably the one covering the old debt? *Ans.* \$2,473.71.

2. If in Ex. 1 the new note due in 3 years were drawn for an even \$2,475, what semiannual interest payments should be made to make the exchange equitable?

3. A owes B \$2,000 due in 2 years without interest, and \$6,000 due in 8 years with interest at 6%, payable semiannually. A wishes to replace these debts with two notes with interest at 5%, payable semiannually, the second note double the first in amount and made payable at the end of the third and the fifth year respectively. Find the amount for which each note is drawn if money is worth (.03, $m = 4$). (See Ex. 5, Section 16, page 29.) *Ans.* \$2,824.21.

4. Solve part (*c*) of illustrative Example 2, above, replacing the \$9,000 note due in 5 years by a \$10,000 note due in 10 years.

5. A is paying \$40 a month on a loan which will pay off in 30 months, and \$60 per month on a second loan on which there are 54 payments yet to be made. If money is worth (.04, $m = 2$), by what monthly payments over a period of 3 years may these two loan payments be replaced equitably? *Ans.* \$121.09.

6. A is paying interest on three separate notes: $4\frac{1}{2}\%$ annually on a \$3,000 note due in 3 years, 5% annually on a \$4,500 note due in $3\frac{1}{2}$ years (last interest payment 6 months ago), and 4%, compounded semiannually, on a \$2,500 note due in 5 years. If money is worth (.03, $m = 4$), at what rate j, payable semiannually, must a note for \$10,500 due in 4 years be made to replace equitably the three notes?

7. The owner of a recently established home has indebtedness at several different places in amounts as listed: \$700, due in 18 months, on which he is paying monthly interest of \$3.50; \$1,100, due in 3 years, on which he pays quarterly interest of \$13.75; and a note for \$650, due in 9 months without interest. On the basis that money is worth 4%, compounded quarterly, a finance company is willing to assume these obligations, and, in return, the home-owner may choose either of two methods of settlement with the company; namely, (*a*) to pay interest at 6% and the face of a note covering the indebtedness and due 2 years hence or (*b*) to pay off the indebtedness by equal monthly payments over a period of 2 years. Find the amount of the note required in (*a*) and the monthly payment required if option (*b*) is chosen. *Ans.* (*a*) \$2,389.87, (*b*) \$107.78.

32. Other useful interpretations of annuity symbols. The more or less simple problems to which we have confined ourselves so far really involve only two fundamental ideas, namely:

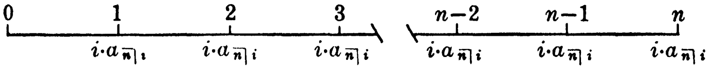
1. The value of a given amount of money on one date is readily evaluated on any other date by multiplying it by a factor of the general form $\left(1+\frac{j}{m}\right)^k$, where k may be either positive or negative.

2. A sequence of equal periodic amounts, made at equal intervals, may be evaluated on any given date by use of the formula designated by the symbol $R \cdot {}^{(m)}a_{\overline{n}|j}^{(p)} \cdot \left(1+\frac{j}{m}\right)^k$.

The expression in 2 will, of course, simplify to the various forms which have been presented, depending principally upon whether k is equal to zero, to n, or to some number different from either 0 or n. The two most important cases of 2 are those in which $k=0$ and $k=mn$, giving $R \cdot {}^{(m)}a_{\overline{n}|j}^{(p)}$ and $R \cdot {}^{(m)}s_{\overline{n}|j}^{(p)}$ respectively.

Since we can interpret these forms as accurately defining the value of particular quantities, our experience in their use enables us to write down some important relations immediately.

An important relation between $s_{\overline{n}|i}$ and $a_{\overline{n}|i}$ may be set up from the following considerations. Let the sum $a_{\overline{n}|i}$ be invested at an interest rate i. At the end of each conversion period thereafter this investment will yield in interest $i \cdot a_{\overline{n}|i}$. Diagrammatically they appear in the following familiar form:



Moreover, the original investment plus the annuity formed by these annual interest payments, evaluated at rate i, would be the amount of the investment at the end of n years, that is,

$$a_{\overline{n}|i} + (i \cdot a_{\overline{n}|i}) \cdot s_{\overline{n}|i} = (1+i)^n \cdot a_{\overline{n}|i}.$$

Replacing the expression on the right, $(1+i)^n \cdot a_{\overline{n}|i}$, by its symbol $s_{\overline{n}|i}$, and dividing each member of the equation by $a_{\overline{n}|i} \cdot s_{\overline{n}|i}$, the equation can be written in a very simple and useful form, thus:

$$a_{\overline{n}|i} \cdot (1 + i \cdot s_{\overline{n}|i}) = s_{\overline{n}|i},$$

or

[45] $$\frac{1}{s_{\overline{n}|i}} + i = \frac{1}{a_{\overline{n}|i}},$$

The student should prove the algebraic equality indicated in formula [45].

The relation given in [45] makes it quite practical for a set of tables to tabulate values of only one of the two symbols $s_{\overline{n}|i}^{-1}$ or $a_{\overline{n}|i}^{-1}$, since one can be readily obtained from the other by simply adding or subtracting the rate i from the value tabulated. Other uses will also be found for this relation.

Frequently the simplification of an annuity leads to a factor $s_{\overline{n|}i}$ or $a_{\overline{n|}i}$ in which n is greater than any recorded in the table. If the annuity designated by these symbols is thought of as being broken up into two annuities of periods n_1 and n_2, such that $n_1 + n_2 = n$, the second annuity beginning at the expiration of the first, then a diagram makes obvious the relations

$$a_{\overline{n|}i} = a_{\overline{n_1|}i} + (1+i)^{-n_1} \cdot a_{\overline{n_2|}i}, \tag{46}$$

$$s_{\overline{n|}i} = s_{\overline{n_1|}i} \cdot (1+i)^{n_2} + s_{\overline{n_2|}i}. \tag{47}$$

The student should also prove the algebraic equality indicated in formulas [46] and [47].

Expressions similar to those given by [46] and [47] for annuities in which $m \neq p \neq 1$ are unnecessary, since the general annuity formulas may always be broken up into factors in which the annuity symbol involving a large value of n would be without the superscripts m and p.

The relatively few fundamental ideas thus far presented are combined in many ways in the various problems met in financial transactions. The complexity of any problem, however, is usually one of interpretation and not one of algebraic manipulation. Certain special problems, such as those pertaining to bonds, depreciation, etc., are treated in separate chapters, as they involve some special definitions; but their solutions, we shall find later, follow readily with the ability to handle annuities properly and with facility.

MISCELLANEOUS EXERCISES

1. The present value of an annuity of \$1,000 per year is \$9,385.07, and the accumulated value is \$15,025.81.

a. At what effective rate of interest are these values computed?

b. What is the duration of the annuity?

Ans. a, .04; *b*, 12 yrs.

2. Evaluate: (*a*) $a_{\overline{120|}.06}$; (*b*) $s_{\overline{110|}.04}$; (*c*) $1200 \cdot {}^{(12)}a^{(12)}_{\overline{20|}.03}$; (*d*) $1200 \cdot {}^{(12)}s^{(12)}_{\overline{25|}.06}$.

3. On a $3\frac{1}{2}\%$ basis, find the annual payment in advance which is equivalent to \$10 monthly in advance. *Ans.* \$118.13.

4. If money can be invested at (.04, $m = 4$), compare the sum necessary to provide \$100 per month for 75 years with the sum necessary to provide \$100 per month forever.

5. Prove algebraically that ${}_{n'-1|}a_{\overline{n|}i} = {}_{n'|}\text{a}_{\overline{n|}i}$.

6. A beneficiary receives \$10,000 and places the whole amount with a trust company with the intention of withdrawing equal instalments at the end of each quarter, exhausting the account in 20 years. If the money is invested at (.04, $m = 2$), (*a*) what sum may be withdrawn each quarter? (*b*) how many withdrawals before the fund is reduced to less than $\frac{1}{4}$ the original amount? to less than $\frac{1}{2}$ the original amount? to less than $\frac{3}{4}$ the original amount?

7. A recent edition of a 24-volume set of books was priced at $145.50. The set could be bought for $5 as a cash payment and 15 monthly payments of $10.30 each. At what nominal rate of interest, compounded semiannually, could one just as well borrow the money and pay cash? *Ans.* 14.97%.

8. Prove that $a_{\overline{\infty}|i} = \frac{1}{d}$.

9. A company was depositing $200 a month in a sinking fund which credited interest at $(.04, m = 2)$. After these payments had continued for 5 years, a depression caused the cessation of the payments. Three years after the last $200 deposit the money was withdrawn from the fund. What was the amount available? (Such an annuity is known as a *forborne annuity*. *Ans.* $14,920.23.

10. A beneficiary **A** deposited $10,000 on April 1, 1942, in a bank which adds $1\frac{1}{2}$% interest semiannually (i.e., .03, $m = 2$). Two years later **A** withdrew $1,000. On April 1, 1945, **A** decided to withdraw such an amount that the fund remaining would furnish his son with $1,000 annually for 9 years, the first $1,000 to be paid April 1, 1947. What amount was withdrawn April 1, 1945?

11. **A** owes **B** $20,000. He pays $5,000 one year from date and $6,000 four years from date. No interest has been paid in the meantime. Just after the $6,000 payment **B** agrees to discharge the remainder of the debt, with interest, by ten equal semiannual instalments. What is the periodical payment if interest is 6%, convertible twice a year? *Ans.* $1,566.80.

12. A bridge costs $30,000 to build. At the end of 5 years and each 2 years thereafter $1,000 must be expended for upkeep.

a. What amount will provide for building and upkeep for the next 35 years if money can be invested at $(.04, m = 2)$?

b. What amount will provide for building and upkeep indefinitely?

13. In Section 32 it was stated that all annuity formulas were a combination of two factors, namely, $R^{(m)}a^{(p)}_{\overline{n}|j}$ and $\left(1 + \frac{j}{m}\right)^k$. Verify this by finding the values of k for which the expression yields formulas [34] to [41] inclusive.

14. Prove the relation $\frac{1}{R \cdot {}^{(m)}a^{(p)}_{\overline{n}|j}} - \frac{1}{R \cdot {}^{(m)}s^{(p)}_{\overline{n}|j}} = \frac{m}{R} \cdot j_{(p/m)}$ at rate $\frac{j}{m}$. (See note, page 19.)

15. Quarterly payments of $250, invested in an enterprise which credits interest semiannually, will amount to $9,750.30 on a given date. The present value of these payments is $6,568.05. If interest is computed at a rate $(j, m = 2)$, find (*a*) the rate j, and (*b*) the length of time covered by the annuity. *Ans.* (*a*) 5%, (*b*) 8 years.

16. What is the present value of payments of $300 quarterly over a period of 8 years, with a payment being made both at the beginning and at the end of the 8 years, if money is evaluated at 5%, compounded quarterly?

17. A has set aside a 5% investment of sufficient size to provide his son with an annuity, the first payment of which is $5,000 one year hence, and each successive payment of which is decreased by $1,000.

a. What is the amount of the investment?

b. If the son is not in immediate need of the money, and places the payments, as they are made, in a trust fund which allows interest at 4%, what amount does he have to his credit at the time of the last payment?

Ans. *a,* $13,410.46; *b,* $16,673.55.

18. How much more has **A** saved than **B** at the end of 15 years if **A** has been depositing $50 at the beginning of every 3 months in a bank which allows 4%, converted semiannually, while **B** has been depositing $100 at the beginning of every 6 months for the same length of time in a bank which pays (.04, $m = 4$)?

19. If money is worth (.04, $m = 4$), on what date would a note for $6,000, with interest payable quarterly at 6%, replace the following debts? $670.61 due in 9 months without interest; $2,100 due in $2\frac{1}{2}$ years with interest at $4\frac{1}{2}$%, payable annually; $3,750, due in 6 years, on which interest is payable annually at 5%. *Ans.* $6\frac{3}{4}$ years.

20. A has a chance to put some money in an investment which allows 3%, compounded monthly. He decides to invest $100 at the end of the first month, $105 at the end of the second month, and so on, increasing the size of his deposits by $5 each month until they have reached $200 per month. What is the value of his investment immediately after his first deposit of $200?

21. Beginning one month from today, a merchant, now 30 years old, wishes to set aside each month for the next 35 years sufficient to allow him to retire at age 65, with a drawing account of $250 per month until age 80. If money can be invested at 6% effective, what sum must be set aside each month? All payments are to be made at the end of the month. *Ans.* $21.79.

22. A radio is priced at $145. It may be bought by a cash payment of $50 and 10 monthly payments of $10 each. At what rate ($j$, $m = 4$) could the buyer as well borrow the money and pay cash?

23. A student borrows $200 at the beginning of each quarter for $4\frac{1}{4}$ years while needing money for college. He is to repay the loan with interest at (.05, $m = 2$) by 20 equal quarterly payments, the first repayment to be made 6 years from the date of the first loan. What is the size of each repayment? *Ans.* $232.74.

24. A finance company makes a loan of $300 and allows 20 months to repay the loan. If the loan is repaid by 20 equal monthly payments of $17 each, find to four decimal places the nominal rate (j, $m = 2$) which the loan is costing the borrower.

25. According to the American Experience Table of Mortality, the average expectation of life of a person age 65 is 11.1 years. Assuming that all persons reaching age 65 should live to be 76.1 years of age, what amount set aside at the beginning of the 11.1-year period, in a 3% investment, would provide an old-age pension of $200 a month for the remainder of a person's life? *Ans.* $22,654.13.

26. What sum paid at the beginning of each year for 10 years, the first payment at the beginning of the seventh year from the present, will provide for paying off a debt of $40,000 if money is worth (.04, $m = 2$) for the first 8 years and 6% effective for the remaining 8 years?

27. A father leaves $30,000 to be divided between his two sons **A** and **B**, now aged 15 and 18 years respectively. The money is invested at (.05, $m = 2$). It is stipulated that each son shall receive a payment on coming of age, and a like amount yearly thereafter until and including the older son's 30th birthday. Determine the annual payment made to each son if the value of each son's inheritance at the time the bequest is made is exactly the same. *Ans.* **A**, $3,325.88; **B**, $2,150.75.

28. Set up and sum the geometric series for $1000 \cdot {}_{3|}^{(4)}s^{(\frac{1}{2})}_{\overline{6}|.04}$. Evaluate to the nearest cent.

29. It is estimated that a certain orchard will mature its first crop in 6 years, yielding a net profit of $10,000. If this same sum is realized each year for 15 years, what is the maximum amount one can pay for a 20-year lease of the orchard in order to realize 8% on his investment? *Ans.* $58,254.37.

30. *a.* What monthly deposit in a fund allowing 3%, convertible monthly, over a period of 10 years, will provide for the owner's withdrawing $100 each month for another 10 years?

b. On what two dates will the fund contain exactly $7,500 if simple interest is used in computing interest for fractional interest periods involved?

31. A building will cost $400,000 to erect. It is estimated that it must be rebuilt every 60 years at 80% of the original cost and be given a complete overhauling every 10th year, not coinciding with a rebuilding, at an estimated expenditure of $30,000. Annual repairs running throughout the year may be assumed to cost $2,000, payable at the end of the year. What endowment will provide the structure, maintenance, and indefinite renewals if money is worth 4%? *Ans.* $542,931.62.

32. The sum of $100,000 is to be equally divided between two hospitals, **A** and **B**. **A** is to receive its share in 15 equal annual instalments, after which **B** is to receive its share in annual instalments indefinitely. If the money is invested at 5%, determine the annual payment made to each hospital.

33. The annuity payments for a period of 20 years are $250 each quarter for 8 years and $400 each quarter for the remaining 12 years. During the first 5 years, interest is computed at (.04, $m = 2$), and at (.03, $m = 4$) for the remaining 15 years. Find the present value of the annuity. *Ans.* $18,914.12.

CHAPTER IV

AMORTIZATION AND SINKING FUNDS

33. The problem. In addition to solving the mathematical problems related to the payment of debts, it seems advisable to suggest some special forms in which to present the results. For instance, the debtor likes to know how the liquidation of his debt is progressing, how much of his payments is going toward payment of debt and how much toward payment of interest. In case of a bonded debt both debtor and creditor find it useful to have a schedule of the number of bonds to be redeemed at stated intervals, so as to make the periodic expense as uniform as possible. These and other problems connected with a general discussion of debt liquidation make it advisable to devote a separate chapter to this subject.

Specifically we shall discuss five different methods of settlement, namely:

1. A fixed number of equal periodic payments cancel both the debt and interest (Section 34).
2. Equal periodic payments of fixed amount cancel both the debt and interest (Section 35).
3. A bonded debt is retired by periodic redemption of bonds (Section 36).
4. Interest payments on the debt are made at regular intervals, and equal periodic amounts are set aside in a sinking fund to cancel the debt when it is due (Section 37).
5. Equal periodic amounts are placed in a sinking fund to cancel the debt with interest at some future date (Section 37).

The first three of these methods are referred to as *amortization.*

The form of presentation showing the progress of liquidation of a debt varies with different organizations and with the different forms assumed by the debt contract. In general, however, the essential thing to be shown in case of amortization is the *amount of the outstanding debt* at successive intervals. This is often referred to as the *book value* of the debt. Other columns usually shown in an amortization table are valuable mainly in setting up and checking the work of the table. In case a debt is being paid by the accumulation of a sinking fund, the important item to be shown is, of course, the amount in the sinking fund at stated intervals. The *difference between the amount in the sinking fund and the value of the debt* on any date is called the *book value* of the debt on that date. Convenient forms for showing the progress of liquidation will be given for the cases under consideration.

34. Amortization by an integral number of payments. Determination of the periodic payments which will liquidate a debt in a given time presents no new problem in the use of annuities. The calculation and presentation of the successive book values are illustrated in the following example.

Example. A debt of \$7,500 is to be amortized by 8 equal semiannual payments which include principal and interest at (.06, $m = 2$). Determine the size of the payments and exhibit the progress of liquidation by an amortization schedule.

Solution. The size of the semiannual payment is given by

$$R \cdot {}^{(2)}a^{(2)}_{\overline{4}|.06} = 7500.$$

$$\therefore \frac{R}{2} = 7500 \cdot a^{-1}_{\overline{8}|.03} = \$1,068.423.$$

Amortization Schedule

Period (1)	Debt at Beginning of Period (2)	Payment at End of Period (3)	PART OF PAYMENT FOR		Total Debt Repaid (6)
			Interest on Debt (4)	Reduction of Debt (5)	
1	\$7,500	\$1,068.423	\$225	\$843.423	\$843.423
2	6,656.577	1,068.423	199.697	868.726	1,712.149
3	5,787.851	1,068.423	173.636	894.787	2,606.936
4	4,893.064	1,068.423	146.792	921.631	3,528.567
5	3,971.433	1,068.423	119.143	949.280	4,477.847
6	3,022.153	1,068.423	90.665	977.758	5,455.605
7	2,044.395	1,068.423	61.332	1,007.091	6,462.696
8	1,037.304	1,068.423	31.119	1,037.304	7,500

This amortization schedule is largely self-explanatory. Interest on the debt, column (4), is found by multiplying the outstanding debt, column (2), by the rate of interest. The last entry in column (5) should exactly equal the last entry in column (2); that is, the last payment should exactly cancel the remaining indebtedness. One finds that, in general, in order to have these two values alike to the nearest cent, the computations must be carried out to three decimal places, as indicated in the table.

The total debt repaid, column (6), is the summation of the payments to date. Columns (2) and (6) are often referred to as the creditor's (seller's) and the debtor's (buyer's) equities respectively. Specifically, when the debt represents the value of property, a useful relation may be stated thus:

[48] (Buyer's equity) + (Seller's equity) = (Cash value of property),

where cash value refers to the value at the beginning of the contract period. The statement given by [48] is, of course, equally true whatever value the debt represents.

It should be emphasized that the order of the columns shown in the table is immaterial. Column (6) is often omitted. Column (3) could obviously be omitted without loss of information, but it does serve as a convenience in setting up the table. The headings of the different columns may often be restated with profit; for instance, the first column title could well be replaced by "Date of Payment" when the dates in a given transaction are given.

A fundamental problem, visualized from the table presented above, is that of finding the outstanding debt on any given date. The solution of this problem is obviously of major importance if the table is not presented. An independent method of determining the book value of the debt on any given date furnishes a check on any given entry in the schedule, and often renders it unnecessary to recompute the whole table to locate an error in computation.

There are two methods, aside from the table, of determining the book value of a debt on a given date:

By the *prospective method* the outstanding debt on a given date is the *present value of the remaining payments.*

The *retrospective method* of evaluation finds the *difference between the debt and the payments both evaluated on the given date.*

Diagrammatically the reason for the choice of the terms "prospective" and "retrospective" is quite obvious, because one method looks forward and the other looks backward from the date under consideration.

Denoting the original debt by P and the amount of the outstanding debt at the end of k years by A_k, we have, by the two methods,

[49] *Prospective:* $$A_k = R \cdot {}^{(m)}a^{(p)}_{\overline{n-k}|j},$$

[50] *Retrospective:* $$A_k = P\left(1 + \frac{j}{m}\right)^{mk} - R \cdot {}^{(m)}s^{(p)}_{\overline{k}|j}.$$

Being able to determine the book value of the debt on a given date also enables one to find readily that part of any particular payment which goes toward payment of interest and that part which is applied on the debt, since the book value on any date is the principal on which interest is payable on the next succeeding payment date.

EXERCISES

1. In the illustrative example above (page 74), check, by both the prospective and retrospective methods, the value of the outstanding debt, as shown by the amortization schedule, at the time of the fifth payment. *Ans.* \$3,022.153.

2. A business concern borrows \$20,000, agreeing to repay the loan, with interest at (.06, $m = 2$), by 12 equal semiannual instalments.

a. Determine the size of the semiannual payment.

b. Construct an amortization schedule for the repayment of the loan.

c. Check, by both the prospective and the retrospective method, the outstanding debt at the beginning of the fourth year.

d. Determine the amount by which the debt is reduced by the payment at $4\frac{1}{2}$ years.

3. A company borrows $15,000 at 5%. The loan is to be repaid, principal and interest, by equal payments at the end of the third, sixth, and ninth years.

a. Determine the triennial payment and exhibit an amortization schedule for the loan.

b. What single payment would settle the remaining indebtedness at the end of 5 years?

Ans. a, $6,652.882; *b,* $11,809.420.

4. *a.* Denoting the payment, the number of the payment, and the rate per payment period by R', k, and r, respectively, prove that the amount by which the debt P is reduced by the kth payment of R' and the total amount repaid to date are given, respectively, by $(R' - P \cdot r)(1 + r)^{k-1}$ and $(R' - P \cdot r) \cdot s_{\overline{k}|r}$.

b. If calculating machine and tables are available, check columns (5) and (6) of the illustrative example above (page 74) by formula given in *a.*

5. If the loan of Ex. 3 had been repaid by three payments of $6,800 each, what interest rate, compounded annually, would the borrower have been paying? Set up an amortization schedule for the loan under this rate. (Guided by the data of Ex. 3, estimate a value of j for interpolation.) *Ans.* ($.171036$, $m = \frac{1}{3}$), $i = .054039$.

6. Prove algebraically the equality of formulas [49] and [50], i.e.,

$$R \cdot {}^{(m)}a^{(p)}_{\overline{n-k}|j} = P\left(1 + \frac{j}{m}\right)^{mk} - R \cdot {}^{(m)}s^{(p)}_{\overline{k}|j}.$$

7. A buys a building lot for $2,500. He signs a contract agreeing to pay off the debt, with interest at ($.04$, $m = 4$), by equal quarterly payments over a period of 4 years.

a. What sum must be paid quarterly?

b. What is the buyer's equity in the property just after making the 12th regular payment?

Ans. a, $169.862; *b,* $1,837.21.

8. A debt of $2,500 is repaid by four equal annual payments of $700 each. What rate of interest is paid on the debt? Construct an amortization schedule for the debt.

9. A piece of property is sold for $18,000. Settlement is made by making a cash payment of $8,000, and the remainder by equal annual payments for the following 15 years. If the debt bears interest at 6%, (*a*) what part of the 10th payment is interest? (*b*) What is the total amount paid out in interest during the liquidation of the debt? *Ans.* (*a*) $303.78, (*b*) $5,444.41.

10. A debt of $18,000 with interest at ($.06$, $m = 12$) is to be paid by monthly payments over a period of 2 years. If the payments are made at the beginning of each month, find (*a*) the monthly payment, and (*b*) the book value of the debt just after the fifteenth payment.

11. A piece of property is sold for $9,000. The remaining indebtedness, after a cash payment of $2,500, is amortized by 10 equal annual payments. If the interest rate is (.06, $m = 2$) for the first 4 years and 5% thereafter, (*a*) what is the annual amortization payment? (*b*) Set up the third, fourth, and fifth lines of the amortization schedule. *Ans.* (*a*) \$870.756, (*b*) $A_5 =$ \$3769.918.

12. **A** makes a cash payment of \$5,000 on a \$40,000 property, the remainder to bear interest at (.05, $m = 2$). At the end of 2 years he turns in another piece of property, valued at \$12,000, to apply on the debt. No other payments of either principal or interest are made until the end of 5 years. At that time **A** begins amortization of the remaining indebtedness by making one of 20 equal annual payments which will liquidate the debt. Find (*a*) the annual payment, and (*b*) the seller's equity in the property at the beginning of the 13th year.

13. A car costs \$786.20. A buyer pays 40% of the price, i.e., \$314.48 cash. The remainder plus 6% of this remainder, i.e., \$500.02, is paid by 20 equal monthly payments of \$25 each. Find (*a*) the rate (j, $m = 12$) which the buyer is paying, and (*b*) the buyer's equity in the car at the end of 9 months, immediately preceding the 10th payment. *Ans.* (*a*) .0672, (*b*) \$518.73.

14. A debt is to be repaid, principal and interest at (.06, $m = 2$), by paying \$1,000 at the end of each 6 months for 10 years. What part of the 7th payment is repayment of principal and what part is interest?

35. Amortization by given periodic payments. The solution of an annuity equation, in which n is the unknown, yields, in general, a value of n such that $p \cdot n$ is not integral. This means that some partial payment different from the usual periodic payment, $\frac{R}{p}$, is involved. Periodic payments are almost invariably given in round numbers, often multiples of fifty or one hundred dollars. It becomes necessary, then, to have some convention as to the method of settlement of the final partial payment. As is the usual custom, we shall always assume, unless otherwise specified, that the *final partial payment is made at the next regular payment date* following the last full payment.

If the last full payment on the debt P is made at n years and the fractional payment fR, $f < \frac{1}{p}$, is made at $n + \frac{1}{p}$ years, then, from the definition of the method of payment, we have

$$\textbf{[51]} \qquad fR = \left[P\left(1 + \frac{j}{m}\right)^{mn} - R \cdot {}^{(m)}s^{(p)}_{\overline{n}|j}\right]\left(1 + \frac{j}{m}\right)^{m/p}.$$

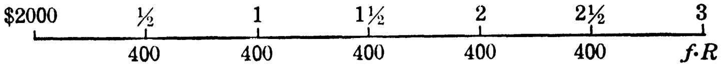
Since it is necessary first to obtain the final partial payment before the prospective method can be used advantageously in determining the outstanding debt A_k, the retrospective method is used almost exclusively in this case. Having found fR, however, the outstanding debt at k years may be expressed as

$$\textbf{[52]} \qquad A_k = R \cdot {}^{(m)}a^{(p)}_{\overline{n-k}|j} + fR\left(1 + \frac{j}{m}\right)^{-m\left(n-k+\frac{1}{p}\right)}.$$

Formulas [51] and [52] are both made readily obvious from a diagram.

Example. A debt of \$2,000 with interest at $(.06, m = 2)$ is to be paid by half-yearly payments of \$400 each. (*a*) Determine the number of full payments and the amount of the final partial payment necessary to liquidate the debt. (*b*) Find the outstanding debt immediately after the third payment is made. (*c*) Check the answers found in (*a*) and (*b*) by setting up an amortization schedule showing the progress of liquidation.

Solution.



(*a*)
$$800\,{}^{(2)}a^{(2)}_{\overline{n}|.06} = 2000.$$
$$a_{\overline{2n}|.03} = 5.$$
$$\therefore 2n = 5. +$$

There are consequently 5 full payments of \$400 each, and a partial payment, *fR*, at the end of 3 years. We have, then,

$$fR = \left[2000(1.03)^5 - 800 \cdot {}^{(2)}s^{(2)}_{\overline{2\frac{1}{2}}|.06}\right] \cdot (1.03) = \$200.741.$$

(*b*) The outstanding debt immediately after the third payment of \$400 is

$$A_{1\frac{1}{2}} = 2000(1.03)^3 - 800 \cdot {}^{(2)}s^{(2)}_{\overline{1\frac{1}{2}}|.06} = \$949.094.$$

(*c*) Amortization Schedule

Period (1)	Debt at Beginning of Period (2)	Payment at End of Period (3)	PART OF PAYMENT FOR		Total Debt Repaid (6)
			Interest on Debt (4)	Reduction of Debt (5).	
1	\$2,000	400	60	340	340
2	1,660	400	49.800	350.200	690.200
3	1,309.800	400	39.294	360.706	1,050.906
4	949.094	400	28.473	371.527	1,422.433
5	577.567	400	17.327	382.673	1,805.106
6	194.894	200.741	5.847	194.894	2,000

Under certain assumptions, the final partial payment is very readily found by an approximate method discussed in Section 64.

EXERCISES

1. A man and wife borrow \$100 from the Small Loan Company and are to repay it by monthly payments of \$20 each. If the monthly payments include interest at $(.08, m = 12)$, find (*a*) the number of \$20 payments required and (*b*) the amount of the final partial payment necessary to cancel the indebtedness. (*c*) Set up a schedule showing the progress and liquidation of the debt. *Ans.* (*a*) 5, (*b*) \$2.05.

2. In the illustrative example above, show that the final partial payment may be expressed as

$$fR = 2000(1.03)^6 - [800 \cdot {}^{(2)}s^{(2)}_{\overline{3}|.06} - 400].$$

Interpret this algebraic statement from the diagram.

3. A buys property for \$18,000 and makes a cash payment of \$6,000. If semiannual payments of \$500 each are made as long as necessary, (*a*) when and for what amount will a final partial payment pay off the remaining indebtedness if interest is at $(.05, m = 4)$? (*b*) What is the buyer's equity in the property just after he has made the 20th payment of \$500? *Ans.* (*a*) 37 payments; \$130.87. (*b*) \$11,069.01.

4. A mortgage for \$15,000 is being repaid by annual payments of \$2,500 each. The interest rate on the debt is reduced from 6%, compounded semiannually, to 5% effective, immediately after the \$2,500 payment which reduces the debt by at least one half. Find the number of full payments and the final partial payment necessary to pay off the mortgage. (The binomial theorem may be used to approximate n.)

5. A manufacturing company buys a building site for \$40,000. The debt is to be repaid by annual payments of \$3,000 each, the first to be made 3 years from the date of purchase. After making 7 payments, the company makes a payment of \$5,000 in addition to the regular payment and receives permission to amortize the remaining indebtedness by 5 additional annual payments. If the interest rate on any outstanding debt remains at 5%, find (*a*) the size of each of the five payments and (*b*) how much sooner the debt is liquidated by making the change. *Ans.* (*a*) \$7,536.04, (*b*) 14 years.

6. A beneficiary is left \$10,000. It is to provide \$200 per month until the fund is exhausted, except for a partial payment which, according to the terms of the provision, is to be made at the time of the last full payment. If the money is invested at $(.04, m = 4)$, when and for what amount will the last payment be made?

7. A parent deposits \$3,000 in an account which credits interest at $(.04, m = 2)$. A child is to make withdrawals of \$400 at the beginning of each 6 months for 4 years while in college, with the exception of the last withdrawal, the eighth, which shall deplete the fund.

a. What will be the amount of the last withdrawal?

b. Set up a schedule showing the progressive exhaustion of the debt.

Ans. a, \$412.87.

8. A debt of \$2,500 with interest at 6% is to be paid by semiannual payments of \$500 each.

a. How many full payments will there be?

b. Set up an amortization schedule for the debt, using compound interest for the fractional interest periods.

9. A business concern buys \$15,000 worth of equipment, agreeing to pay \$250 a month for 4 years and \$400 a month thereafter until the debt, with interest at $(.06, m = 12)$, is paid.

a. When and for what amount will the final payment be made?

b. Set up the schedule for the 46th to the 50th payment periods inclusive.

Ans. a, 63d payment, \$148.06; *b*, $A_{45} = \$6,163.27$.

36. Amortization of a bonded debt. Oftentimes, when a large business organization negotiates a loan, it is done by issuing bonds of small denomination, say of one hundred or one thousand dollars. The loan is then repaid by the periodic redemption of the bonds over a fixed period of time.

Since fractional parts of a bond cannot be redeemed, the essential problem is to devise a schedule of redemption that will make the cost from period to period as nearly the same as possible.

Since the amortization payment which will exactly amortize a given debt in a given period is easily found (Section 34), this amount may be used as a guide in determining the number of bonds to be redeemed on any given date. Hence we determine the size of such an equal periodic amortization payment and, after deducting from this the amount of interest due on the debt, redeem that number of bonds whose face value most nearly equals the remainder of this amortization payment. The difference between the total expense for the particular payment period in question and the periodic amortization payment, as calculated, should be carried in a surplus (positive or negative) column and added, with interest, to the regular amortization payment to serve as a guide in determining the number of bonds to be redeemed on the next regular redemption date. This process, repeated successively, will ensure a minimum variation in the annual expense of the debt, as was desired.

Denoting the value of one of the equal periodic amortization payments by R, the interest on outstanding bonds at n years by I_n, and the surplus at n years by s_n, then the amount available for redemption of bonds at n years will be $R-(I_n-s_{n-1})$.

The procedure above assumes that the redemption price of the bonds is at par. If the redemption price is below (or above) par, then the value of R as computed must be reduced (or increased) by an amount R', such that $R'^{(m)}s_{\overline{n}|j}^{(p)}$ is the amount of the final entry in the surplus column of a trial schedule.

Example. A loan of \$50,000 at 5% interest is secured through the issuance of bonds of \$1,000 denomination. The debt is to be amortized by 6 annual redemptions, such that the annual costs are as nearly equal as possible. Construct the amortization schedule.

Solution. Following the procedure as outlined above, we have

$$R=a_{\overline{6}|.05}^{-1}\times 50{,}000=\$9{,}850.874.$$

Amortization Schedule

Year (1)	Debt at Beginning of Period (2)	Interest on Bonds at 5% (3)	Available for Bond Redemption (4)	Number of Bonds Redeemed (5)	Total Payment (6)	Surplus (7)
1	\$50,000	\$2,500	\$7,350.874	7	\$9,500	\$350.874
2	43,000	2,150	8,069.292	8	10,150	69.292
3	35,000	1,750	8,173.631	8	9,750	173.631
4	27,000	1,350	8,683.187	9	10,350	− 316.813
5	18,000	900	8,618.220	9	9,900	− 381.780
6	9,000	450	9,000.005	9	9,450	.005

For the sake of clarity, let us review line 4 of the schedule. It is noticed that \$8,683.187 is available for redemption of bonds. Redemption of only 8 bonds would leave \$683.187 surplus, more than half the price of a bond, and hence 9 bonds are redeemed. This leaves a negative surplus (deficit) of \$316.813, which with interest at 5% is \$332.654. The amount available for redemption of bonds on the next redemption date is therefore \$9,850.874 − (900 + 332.654), or \$8,618.220.

The outstanding debt at any time can be obtained by either the prospective or the retrospective method, remembering that the amount must be adjusted by using the *nearest thousand* dollars. For instance, at the beginning of the fourth year, we have

$$A_4 = 50{,}000(1.05)^3 - 9{,}850.875 \cdot s_{\overline{3}|.05} = 9{,}850.875 \cdot a_{\overline{3}|.05} = \$26{,}826.376,$$

which, to the nearest thousand dollars, is \$27,000, thus checking the corresponding entry in the table. The difference between these two values also checks (within the accuracy of the tables) the surplus entry of the previous period.

EXERCISES

1. Bonds in denominations of \$1000 each, to the amount of \$15,000, bearing interest at 7%, are to be redeemed in three annual instalments, with annual costs as nearly equal as possible. Set up an amortization schedule, showing the progress of the redemption. *Ans.* \$5,715.775.

2. Thirty \$1,000 bonds bearing interest at 5% are issued to raise money for plant extension. Redemption of all bonds is to be made in a period of 8 years, with the annual expense as uniform as possible.

a. Set up the schedule showing redemption of the bonds.

b. Without use of the schedule, find the number of unredeemed bonds at the beginning of the fifth year.

3. A bonded debt of \$10,000 with interest at 6%, convertible semiannually, and paid only on redemption dates, is to be extinguished by 5 annual redemptions. Set up an amortization schedule which will make the annual expense as nearly uniform as possible if the bonds are in denominations of \$100. *Ans.* \$2,379.779.

4. An indebtedness represented by 25 one-thousand-dollar 6% bonds is to be paid off in the next 5 years. Construct an amortization schedule for the redemption of the bonds which will make the annual expense as uniform as possible.

5. A \$10,000 issue of 4% bonds is to be redeemed in 5 years. If the bonds are in denominations of \$1,000 and each bond is redeemed at \$1,050, construct a schedule for redemption which will allow a minimum variation in the annual expense. *Ans.* \$2,346.52.

37. Debt retirement by means of a sinking fund. The contraction of a debt is usually accompanied by specific provisions for its repayment.

Gradual reduction of the liability incurred, by means of periodic payments in some form, is very often provided for, even though not required. A creditor may, for instance, make a loan contingent upon keeping the entire investment at interest for the entire duration of the loan; or a borrower may desire, for some reason, to repay the loan in a lump sum at some future date if he himself is borrowing the money for investment. In either case gradual reduction of the burden is often accomplished by means of periodic payments into a sinking fund.

The more common practice of repaying a debt by a single sum at some future date is (1) to pay the interest on the debt at the end of each conversion period and (2) to make such equal periodic contributions to a sinking fund as will accumulate to a sum which exactly cancels the debt at the time it becomes due. If interest on the debt and payments into the sinking fund are made on the same dates, which is usually the case, then the periodic expense to the borrower is the sum of these two amounts.

Occasionally both the debt and the interest are paid in a single sum at some future date. The periodic payment to be made to a sinking fund is determined, in this case also, merely by solving an annuity equation in which R is the unknown. The periodic expense of the debt is, of course, simply the sinking-fund payment.

The *book value of the debt on a given date*, in either of the cases discussed above, is defined as the *difference between the value of the debt and the value of the sinking fund on the date in question.*

An example of the first of the two cases under discussion is presented for illustration.

Example. A contracts a debt of \$8,000 on which he must pay interest annually at 5%. The debt itself must be paid at the end of 5 years. To provide for repayment, annual deposits are made into a sinking fund which allows interest at (.04, $m = 4$). (a) Determine the annual expense of the debt. (b) Find the book value of the debt just after the third payment. (c) Set up a schedule showing the progress of the sinking fund from year to year.

Solution. The annual payment into the sinking fund is

$$R = 8000 \times s^{-1}_{\overline{20|}.01} \times s_{\overline{4|}.01} = \$1,475.235.$$

(a) $\therefore$ Annual expense $= \$400 + 1,475.235 = \$1,875.235.$
(b) The indebtedness immediately after the third payment into the sinking fund is still only \$8,000, since the interest is kept paid up. The book value of the debt is therefore

$$\begin{aligned} A_3 &= \$8,000 - 1,475.235 \times {}^{(4)}s_{\overline{3|}.04} \\ &= 8,000 - 1,475.235 \times s_{\overline{12|}.01} . s^{-1}_{\overline{4|}.01} \\ &= \$3,392.162. \end{aligned}$$

(*c*)

Sinking-Fund Schedule

Payment	In Fund at Beginning of Interval	Interest for Year at (.04, $m = 4$)	Payment at End of Interval	Total Increase for Interval	In Fund at End of Interval
1	$ 0	$ 0	$1,475.235	$1,475.235	$1,475.235
2	1,475.235	59.900	1,475.235	1,535.135	3,010.370
3	3,010.370	122.233	1,475.235	1,597.468	4,607.838
4	4,607.838	187.097	1,475.235	1,662.332	6,270.170
5	6,270.170	254.594	1,475.235	1,729.829	7,999.999

In the notation of Ex. 4, page 76, the increase to the sinking fund for the kth interval is $R'(1+r)^{k-1}$, and the total sum in the fund at the end of the kth interval is $R' \cdot s_{\overline{k}|r}$.

EXERCISES

1. A small business concern borrows $6,500, agreeing to pay interest semiannually at the rate (.06, $m = 2$), and to set aside half-yearly deposits in a sinking fund allowing 4%, converted semiannually, sufficient to pay the debt at the end of 3 years. Find (*a*) the semiannual expense of the debt, and (*b*) the book value of the debt at the end of 2 years. (*c*) Set up a schedule showing the growth of the sinking fund. *Ans.* (*a*) $1,225.42, (*b*) $2,253.02.

2. What semiannual payment will be necessary to pay interest at 5% nominal, convertible semiannually, on a debt of $10,000, and supply a sinking fund, allowing interest at (.04, $m = 2$), which will extinguish the debt in 2 years? Make out a schedule to show the accumulation of the sinking fund.

3. After paying interest annually at the rate of (.05, $m = 2$), on a debt of $10,000, the remainder of an annual payment of $1,500 is placed in a sinking fund. The amount in the fund just after the 8th deposit is exactly sufficient to liquidate the debt.

a. At what rate of interest is the sinking fund being accumulated?

b. Set up a schedule showing the progress of the sinking fund.

Ans. a, .064614.

4. A buys property valued at $50,000 and pays one half of it in cash. To provide for payment of the remaining $25,000 at the end of 12 years, semiannual payments are made into a sinking fund which allows interest at (.04, $m = 2$). If the debt bears interest at 6%, payable semiannually, find (*a*) the semiannual expense to the buyer, and (*b*) the amount in the fund at the end of 6 years. (*c*) What part of the increase in the fund during the 13th period is due to accumulation of interest? (*d*) What amount in addition to that in the sinking fund will liquidate the debt at the end of the 13th period?

5. A is able to obtain a loan of $12,000 by agreeing to accumulate a sinking fund to pay the debt and interest in a single sum at the end of 7½ years, the interest to be calculated at (.05, $m = 2$). If payments are made twice a year into a fund which allows interest at (.04, $m = 2$), find (*a*) the size of the equal periodic payments, and (*b*) the book value of the debt at the end of 5 years. *Ans.* (*a*) $1,004.98, (*b*) $4,356.74.

38. Comparison of amortization and sinking-fund methods of debt retirement. When a debt is contracted, the rate of interest received by the creditor is, in either of the methods under consideration, fixed. The only question affecting him is whether the entire debt is to bear interest at this rate for the complete duration of the loan or whether he is to receive this rate on a gradually reduced amount, due to amortization. In either case, however, he receives this fixed rate on the amount he has invested at any given time.

The debtor's choice between amortization and the accumulation of a sinking fund to pay the debt would always be the cheaper of the two. It is always fairly obvious which one of the two is the cheaper. To the debtor it is immaterial to whom he makes the payments for reducing his debt obligation — whether they are made to the person to whom he owes the debt or whether they are made to the operator of a sinking fund. The material consideration to him is which of the two allows the greater interest rate on these payments. One point of view of amortization is, of course, that the creditor is allowing interest on the periodic payments at the rate of interest borne by the debt. (See Ex. 4 below.) If, then, j_1 and j_2 be the interest rates borne by the debt and allowed by the sinking fund, respectively, the periodic expense on a debt of P dollars by the sinking-fund method, $P \cdot \frac{j_1}{m} + P \cdot s^{-1}_{\overline{mn}|j_2/m}$, is greater than, equal to, or less than the amortization expense, $P \cdot a^{-1}_{\overline{mn}|j_1/m}$, according as j_2 is greater than, equal to, or less than j_1.

Algebraically the truth of the preceding statement is just as readily seen. If $j_1 = j_2$, the equality of the two corresponding expressions for the annual expense is given by formula [43], already proved. In the above notation it would be

$$P\left[\frac{j}{m} + s^{-1}_{\overline{mn}|j/m}\right] = P \cdot a^{-1}_{\overline{mn}|j/m}. \qquad \text{(See formula [43])}$$

Proof of the inequalities resulting when $j_1 \neq j_2$ follows directly, since $s^{-1}_{\overline{mn}|j_2/m}$ decreases as j_2 increases, while $a^{-1}_{\overline{mn}|j_1/m}$ increases as j_1 increases, and vice versa.

MISCELLANEOUS EXERCISES

1. A loan of $30,000 is to be repaid in a single sum at the end of 10 years. Interest is to be paid semiannually at a nominal rate of 6%, and semiannual payments into a sinking fund are accumulated at (.04, $m = 2$) to pay the debt when due.

a. Determine the periodic sinking-fund payment.

b. At the time of the tenth payment it is agreed to turn over the amount in the sinking fund to the creditor and to amortize the remaining indebtedness by 6 semiannual payments. Determine the amortization payment.

Ans. a, $1,234.70; *b,* $3,042.23.

2. A loan of \$20,000 at 6% is paid off in 3 equal annual instalments, including principal and interest. Calculate the amount of the annual payment, and draw up a schedule with descriptive headings showing the progress of the loan during the 3 years.

3. Adjust the schedule in the preceding problem to a short-term bond issue of denomination \$500, drawing up a schedule with proper descriptive headings and showing the progress of the bond retirement during the 3 years. The bonds are redeemed at par. *Ans.* \$7,482.196.

4. It was stated in Section 38 that one point of view of amortization is that the creditor is allowing interest on the periodic payments at the rate borne by the debt. This may be visualized by comparing the amortization schedule and sinking-fund schedule for the retirement of a debt. Let the debt be \$5,000 with interest at 4%, and set up schedules for the two methods of liquidating the debt in 5 years, the sinking-fund rate being 4% also.

5. A customer is offered the option of paying a debt, with interest at 6% effective, in 10 equal annual payments of P dollars each or of paying interest annually as due at $5\frac{3}{4}$% and paying the principal at the end of 10 years. If he can accumulate a sinking fund at $4\frac{1}{2}$% effective, which option offers the smaller annual expense? *Ans.* Amortization, by $.00301 \cdot P$.

6. The purchase price of a piece of property is \$10,000, of which \$4,000 is paid in cash at the time of purchase. Interest on the remaining indebtedness is at 6% and is paid annually. Annual payments into a sinking fund allowing interest at 6% provide for payment of the debt at the end of 6 years. At the end of 3 years it is decided to remit to the creditor the amount in the sinking fund and to amortize the remaining indebtedness during the following 3 years. Set up a schedule, or schedules, showing the progress of liquidation through the complete 6 years.

7. **A** sells a piece of property for \$17,500. He receives a cash payment of \$5,000, and a contract calling for amortization of the remaining indebtedness, with interest at $(.06, m = 2)$, by semiannual payments for the following 15 years. At the beginning of the ninth year he needs the money and sells the contract to a purchaser, **B**, at a price which enables **B** to make 8% on the investment. Find the price which **B** pays for the contract. *Ans.* \$6,770.88.

8. Solve Ex. 7 with the statement concerning the contract altered by replacing "semiannual payments for the following 15 years" by "semiannual payments of \$625 each, as long as necessary, plus whatever partial payment is required to liquidate the debt at the next regular payment date."

9. **A** incurs a debt of \$20,000 which must be paid immediately. He can accumulate a sinking fund at $(.04, m = 4)$. He can borrow money from one source at $(.05, m = 4)$ sufficient to pay the debt if he agrees to repay the loan by a single payment at the end of 12 years.

a. At what nominal rate, compounded quarterly, could **A** just as well borrow the \$20,000 from a second source, where he has the option of amortizing the debt, principal and interest, by quarterly payments for 12 years?

b. Solve the same problem if the sinking-fund rate is $(.06, m = 2)$ and the rate at which he can borrow the money is 6% effective instead of $(.05, m = 4)$.

Ans. a, $(.0566, m = 4)$; *b,* $(.0424, m = 4)$.

10. Among the papers found in the settlement of an estate is an uncashed check made out to the former owner of the estate for \$1,142.59 and dated March 1, 1939. It is attached to a fragment of an amortization schedule, shown below:

Mar. -1- '41					
Sept. -1- '41	3,263.26				
Mar. -1- '42	2,202.26	1,142.59	55.05	1,087.54	
Sept. -1- '42	1,114.72	1,142.59	27.87	1,114.70	10,000.00

a. What part of the debt was still unpaid at the time the check was drawn?

b. What part of the check must be credited to interest and what part applied on the debt?

11. A company can borrow \$100,000 at 6%, provided a sinking fund is set up to provide for repayment of the loan with interest in a single sum at the end of 10 years. The company can use this loan in its business to yield a return of 18% and can accumulate a sinking fund at 4%.

a. Show that the general expression for the increase from this loan in the value of the business at the end of k years is given by the expression

$$[100{,}000 \times .18 - 100{,}000 \times 1.06^{10} \times s^{-1}_{\overline{10}|.04}]s_{\overline{k}|.18},$$

checking the result for $k = 1$ and $k = 2$.

b. What is the value of the original investment at the end of 10 years?

c. If the entire 18% return from the capital is reinvested in the business each year, the sinking fund at 4% only showing on the books of the company to comply with the specifications of the loan, and if settlement of the loan, when due, is made from the treasury of the company, then by what amount is the value of the business increased from use of the loan in the 10 years? Give the results to the nearest dollar.

Ans. b, \$172,536; *c,* \$244,299.

CHAPTER V

BUILDING AND LOAN ASSOCIATIONS

39. Object and methods. The distinguishing characteristic of a building and loan association is that it is a loan association organized primarily for the benefit of those who need and desire loans for a particular purpose. The benefit accrues from the fact that the borrower is not only a borrower but also a sharer in the profits of the organization, since each applicant for a loan is automatically made a member of the association upon the acceptance of his loan application. Moreover, the projects made possible by these loans stimulate a high civic interest, which adds value and background to the object of the loan. A mutual organization to provide, primarily, for the building of homes has, by its nature, a clientele of preferred risks in which the moral hazard, such as is often encountered in certain other agencies, is very low.

Although not a problem for mathematical treatment, the question of source of profit for such an organization might seem to present contradictory problems, since to borrow one's own money would not seem to be a fluent source of income. However, in addition to interest received from borrowers, there are usually other sources of profit in a well-managed organization, such as:

1. Money borrowed from other sources at lower interest rates than those received by the association.
2. Fines for nonpayment of dues on the dates specified.
3. Fines for withdrawals before the expiration of the contracts, these fines against the borrower often taking the form of forfeiture of part of his interest earnings as an investor.
4. Entrance fees.

As regards 2 and 3 it should be pointed out that a growing practice is that of paying a bonus for prompt payment of dues and for keeping savings intact. The moral effect of this procedure has advantages. Failure to earn these bonuses, however, does constitute a fine in a very real sense.

Two distinctive features of a building and loan contract are (1) all payments are made at the beginning of the payment interval and (2) interest-conversion intervals, unless otherwise specified, are always taken as equal to the payment interval. Under the older forms of certain building-and-loan-association contracts, some of which are still practiced, unequal payment and conversion intervals did exist; and some of these will be discussed in the latter part of the chapter, since they present some valuable techniques in the solution of financial problems.

40. Loan plans in operation. Although the methods vary from one locality to another, essential types of contracts offered are given by the three following loan plans:

1. *Direct-reduction* plan.
2. *Cancellation-and-endorsement* plan.
3. *Share-accumulation* plan.

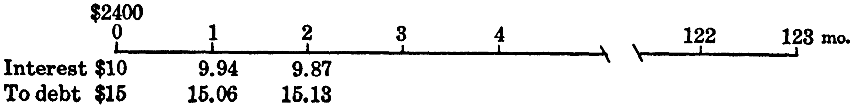
The first of these three plans involves a direct loan from the association. In the second and third plans the association issues *shares,* sometimes referred to as *shares of stock,* and the borrower buys shares equal in value to the amount of the loan he desires, the shares, when paid for, reverting to the association in payment for the loan. Shares are usually in denominations of fifty or one hundred dollars.

The last of these three plans was for a long time the one most widely used, but more recently the *direct-reduction plan* has come into very general use.* The mathematical problems involved in the three plans will be presented in the order named above.

41. Direct-reduction plan. The *direct-reduction plan* is practically that of debt amortization presented in the previous chapter. The essential differences are that *the amortization payments are made at the beginning of the payment interval* and that *the interest on the outstanding debt is paid at the beginning of this interval* also. The reader should not confuse this *interest paid in advance* with the handling of discount rates encountered earlier in the text. A borrower's account would appear, then, much the same as an amortization schedule with whatever periodic adjustments are made necessary by tardy payment of dues, changing interest rates, etc.

Example. On May 1, 1940, A borrows \$2,400 from a building and loan association on which he pays dues of \$25 at the beginning of each month, the dues to pay interest on the outstanding debt at $\frac{5}{12}\%$ per month and the balance used as direct reduction of the debt. If the interest rate is maintained throughout the duration of the loan and all payments are made promptly, find (a) the number of \$25 payments necessary, (b) the unpaid balance of the loan at the end of 10 years, and (c) the final partial payment necessary to liquidate the loan.

Solution. We may picture on a diagram the early payments as they are divided between interest and amount applied on the debt:



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* Bodfish & Theobald, *Savings and Loan Principles.* Prentice-Hall, Inc.

It is readily obvious that, even though payments are made at the beginning of the interval, we have

$$V_0 = 2400(1 + \tfrac{5}{12}\%)^1 - 25 \cdot s_{\overline{1}|\frac{5}{12}\%} = \$2,385,$$
$$V_1 = 2400(1 + \tfrac{5}{12}\%)^2 - 25 \cdot s_{\overline{2}|\frac{5}{12}\%} = \$2,369.94,$$
etc.

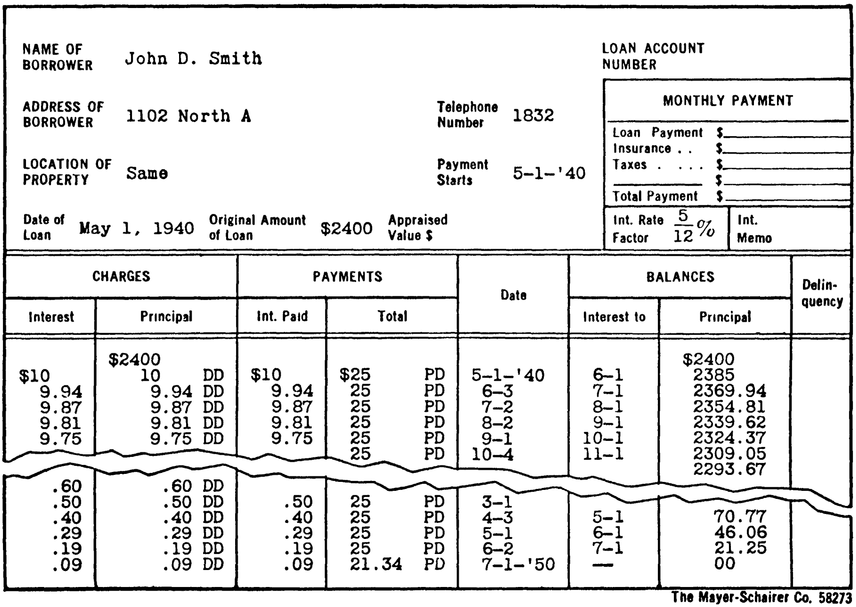
The effect of paying the interest in advance is, from the mathematical standpoint, equivalent to having borrowed the $2,400 one month earlier. The solutions desired are thus readily found, as follows:

(*a*) $$25 \cdot a_{\overline{12n}|\frac{5}{12}\%} = 2400.$$
$$12n = 122.+$$

(*b*) $$V_{120} = 2400(1 + \tfrac{5}{12}\%)^{121} - 25 \cdot s_{\overline{121}|\frac{5}{12}\%} = \$46.06.$$

(*c*) $$fR = 2400(1 + \tfrac{5}{12}\%)^{123} - (25 \cdot s_{\overline{123}|\frac{5}{12}\%} - 25) = \$21.34.$$

An amortization schedule of almost identical form as that used in the previous chapter might be exhibited, but this method of handling building and loan accounts has assumed such importance that it is worth while to present a typical form and partial account of the borrower in the example above.



NAME OF BORROWER John D. Smith

LOAN ACCOUNT NUMBER

ADDRESS OF BORROWER 1102 North A

Telephone Number 1832

LOCATION OF PROPERTY Same

Payment Starts 5-1-'40

MONTHLY PAYMENT
Loan Payment $
Insurance . . $
Taxes . . . . $
$
Total Payment $

Date of Loan May 1, 1940 Original Amount of Loan $2400 Appraised Value $

Int. Rate Factor $\frac{5}{12}\%$ Int. Memo

CHARGES		PAYMENTS		Date	BALANCES		Delinquency
Interest	Principal	Int. Paid	Total		Interest to	Principal	
	$2400					$2400	
$10	10 DD	$10	$25 PD	5-1-'40	6-1	2385	
9.94	9.94 DD	9.94	25 PD	6-3	7-1	2369.94	
9.87	9.87 DD	9.87	25 PD	7-2	8-1	2354.81	
9.81	9.81 DD	9.81	25 PD	8-2	9-1	2339.62	
9.75	9.75 DD	9.75	25 PD	9-1	10-1	2324.37	
			25 PD	10-4	11-1	2309.05	
						2293.67	
.60	.60 DD						
.50	.50 DD	.50	25 PD	3-1			
.40	.40 DD	.40	25 PD	4-3	5-1	70.77	
.29	.29 DD	.29	25 PD	5-1	6-1	46.06	
.19	.19 DD	.19	25 PD	6-2	7-1	21.25	
.09	.09 DD	.09	21.34 PD	7-1-'50	—	00	

The Mayer-Schairer Co. 58273

Direct Reduction Loan Account

EXERCISES

1. The builder of a small home secures a \$4,500 loan from a building and loan association. A payment of \$45 at the beginning of each month is to provide for interest on the outstanding debt at $(.06, m = 12)$, the remainder to be applied as repayment of principal.

a. When and for what amount will the final payment be made?

b. Set up the first four and the last three lines of schedule of the form exhibited above.

Ans. a, on the 139th payment; \$43.91.

2. If monthly dues are 1% of the amount of the loan, and the final partial payment is made to the nearest cent on each \$100 borrowed, find the number of payments and the amount of the final partial payment for contracts issued by an association operating under the following interest rates, compounded monthly: (*a*) .03, (*b*) .04, (*c*) .05, and (*d*) .06.

3. In Ex. 1, how many payments are made before the debt is reduced by at least one half? *Ans.* 82 payments.

4. A man and his wife desire a loan of \$6,400. A building and loan company offers to grant the loan at $(.04, m = 4)$ if they can arrange to make quarterly payments equal to, or greater than, 2% of the desired loan. They accept this offer, paying \$130 each quarter. (*a*) When and for what amount will the final partial payment be made? (*b*) Set up the last three lines of amortization schedule.

5. A receives a \$5,000 loan from a building and loan association. He is to pay interest at $(.06, m = 12)$ until monthly payments of \$50 each reduce the loan by at least one half (82 monthly payments), after which the interest is to be reduced to $(.05, m = 4)$ and the periodic payments changed to \$150 each quarter.

a. When and for what amount will the final partial payment be made?

b. Set up that part of the schedule which shows the last two monthly and the first two quarterly payments.

Ans. a, \$87.59, at 19th quarterly-payment period; *b,* $A_{6\frac{2}{3}} = \$2{,}547.837$.

42. Cancellation-and-endorsement plan. From the standpoint of determining the duration, the outstanding debt at any time, and the final partial payment, the cancellation-and-endorsement plan is essentially the same as the direct-reduction plan. The borrower secures a loan, and subscribes for shares in the association corresponding to the value of the loan desired. That part of the monthly dues remaining after paying interest on uncanceled shares is accumulated and applied as reduction of indebtedness by *canceling a share* as soon as the accumulation amounts to as much as \$100, the price of a share. The loan is then *endorsed* for the amount of the reduced number of shares. This process is continued until all shares have been canceled. Thus it is merely a matter of *where* the remainder is credited and *when* it is transferred to debt reduction. A comparison of the two plans is readily made by using the data of the illustrative example of the preceding section. The problem is restated in the following example.

Example. On May 1, 1940, **A** borrows $2,400 and subscribes for 24 shares of $100 each in a building and loan association. Dues of $25 at the beginning of each month are paid as long as necessary to pay interest monthly in advance at 5% on the outstanding debt and to pay for the 24 shares, each of which reverts to the association, as paid for, to apply on the debt. Find (*a*) the number of $25 payments necessary, (*b*) the unpaid balance of the debt at the end of 10 years, and (*c*) the amount of the final partial payment.

Solution. The solutions are exactly those of the illustrative example of the direct-reduction plan (page 88). The process of liquidation may be presented in the following form:

Cancellation and Reduction Schedule

Date	Value of Uncanceled Shares	Interest on Uncanceled Shares at $\frac{5}{12}\%$	Monthly Payment	Credited to Borrower's Account	Total Accumulation at $\frac{5}{12}\%$
5-1-'40	$2,400	$10	$25	$15.00	$15.00
6-3		10	25	15.06	30.06
7-3		10	25	15.13	45.19
8-2		10	25	15.19	60.38
9-1		10	25	15.25	75.63
10-4		10	25	15.32	90.95
11-1		10	25	15.38	6.33
12-2	2,300	9.58	25	15.44	21.77
1-1-'41		9.58	25	15.51	37.28
2-3		9.58	25	15.57	52.85
. . .		. . .	. . .	. . .	. . .
. . .		. . .	. . .	. . .	. . .

Although the construction of the above table is fairly obvious, it may be pointed out that any entry in column five is the monthly payment, less the interest on canceled shares, plus the interest on the total accumulation given in the line immediately above the entry in question. For instance, opposite the date 11-1-1940 there is $(\$25 - \$10) + \frac{5}{12}\% \cdot (\$90.95) = \$15.38$ to be added to the borrower's account. This total, $\$15.35 + \$90.95 = \$106.33$, makes it possible to retire one $100 share, with $6.33 remaining on the account.

Comparing the borrower's indebtedness from the partial schedules of the direct-reduction plan and the cancellation-and-reduction plan, it is seen, for instance, that the amount of debt unpaid on 11-1-'40 is, from the former plan, $2,293.67 and, from the latter, it is $\$2{,}300 - \$6.33$, which is also $2,293.67.

The number of shares outstanding is always equal to the integral number of hundreds of dollars in the outstanding indebtedness.

EXERCISES

1. An advertisement contains the following statement: All interest being computed at 6%, compounded monthly, a \$1,000 loan may be paid by equal monthly payments of

(*a*) \$10.00 per month for 11 years and 7 months.
(*b*) 8.44 per month for 15 years.
(*c*) 7.16 per month for 20 years.
(*d*) 6.44 per month for 25 years.
(*e*) 6.00 per month for 30 years.

Check these figures. Is the loan overpaid, and, if so, by how much? *Ans.* All overpaid, as follows: (*a*) \$.24. (*b*) \$.42. (*c*) \$1.19. (*d*) \$2.09. (*e*) \$4.42.

2. Assuming the loan to be represented by \$100 shares:

(*a*) Set up the first 5 lines of schedule for retiring the shares by the cancellation-and-endorsement plan, using the data of Ex. 1, page 90.

(*b*) Do the same for the data of Ex. 4 on the same page.

43. Share-accumulation plan. The share-accumulation plan differs from the cancellation-and-endorsement plan only in that no shares are canceled until all are paid for. Thus, at the beginning of each payment interval the borrower pays dues on the instalment shares and, in addition, pays interest on the loan for one payment interval. When all of the shares are completely paid for, they are turned over to the association in payment for the loan.

The benefit which the borrower receives from obtaining this type of loan from an association may best be measured by determining the rate of interest at which the borrower may consider he is amortizing his debt. Thus, if the dividend rate can be estimated with reasonable accuracy, then a comparison with other available sources of obtaining a loan may be made. If at the expiration of the contract the dividend rate has had a wide variation between the time of purchase and maturity, one may also as readily determine the corresponding amortization rate.

The periodic payment under the share-accumulation plan, instead of being some convenient multiple of \$25 or \$50, say, is much more likely to be quoted as so much per share, so determined as to run for some convenient duration.

Example 1. A must borrow \$2,400 for building purposes. He can borrow from a building and loan association which charges 6%, payable monthly in advance. A \$100 share, requiring a payment of \$1.42 per month, will mature at the end of 5 years with a payment of \$.43. A can secure a private loan at only 5%, payable semiannually, and can provide for retirement of the debt at the end of 5 years by semiannual payments into a sinking fund which allows (.03, $m = 2$). Which of the two sources is the cheaper?

Solution. If A accepts the services of the building and loan association, he will pay at the beginning of each month dues amounting to $34.08, plus $12 interest. Amortization of the $2,400 debt by monthly payments of $34.08 + $12, or $46.08, would be equivalent to amortizing the loan at ($.0617, m = 12$), as found by interpolation from the equation

$$46.08\, a_{\overline{59}|j/12} + 24(.43)\left(1 + \frac{j}{12}\right)^{-60} = 2400 - 46.08.$$

Acceptance of the private loan would entail a semiannual expense of $60 interest and a sinking-fund payment of $224.24; that is, $\left(\frac{R}{2} = 2400 \cdot s^{-1}_{\overline{10}|.015}\right)$. The corresponding amortization rate from the equation $284.24 \cdot a_{\overline{10}|j/2} = 2400$ is found to be ($.0641, m = 2$). The building and loan association rate is obviously the better rate. (The student should check this last statement.)

Example 2. A must borrow $2,400 for building purposes. He can borrow from a building and loan association which charges interest at 6%, payable monthly in advance. A $100 share, requiring dues of $1.42 per month, will mature at the end of 5 years with a payment of $.43 at that time. A can also borrow elsewhere at 5%, compounded monthly; and if he does he will deposit monthly in a sinking fund at 3%, compounded monthly, the difference between the interest on this 5% loan and the total monthly payment he would otherwise make to the building and loan association. Would he gain or lose by choosing this 5% loan?

Solution. As in Example 1, the monthly payment to the building and loan association would be $46.08. Interest on the loan from the second source would be $10 at the end of each month. There would therefore be available for the sinking fund $46.08 at the end of the first month; only 24($.43) − $10, or $.32, at the end of the last month; and $36.08 at the end of each of the other months. Hence at the end of 5 years the sinking fund would contain

$$\$46.08(1.0025)^{60} + 36.08 \cdot s_{\overline{59}|\frac{1}{4}\%} \cdot (1.0025) + .32 = \$2,350.23.$$

Therefore, under the conditions of the problem, the loan from the association is the cheaper of the two.

EXERCISES

1. A shareholder in an association is paying $5.83 interest and $5 dues at the beginning of each month on ten $100 shares. If the shares mature at the end of 130 months, without a payment at that time, at what rate (j, $m = 12$) may he consider he is amortizing his loan? *Ans.* .0681.

2. An association charges 6%, payable monthly in advance, on loans. A $100 share will mature 84 months from date of purchase by the payment of $1 dues at the beginning of each of the 84 months. What is the largest monthly amortization rate which a prospective borrower could afford to pay elsewhere in order to better this quotation from the association?

3. Loans are made by an association which charges 7.2% interest, payable monthly in advance. A $100 share of the association on which dues of $1 per month are paid will mature at the end of 6½ years without a payment at that time.

Another source offers to loan money at 6%, payable semiannually. A borrower can set aside money at the end of each 6 months at (.03, $m = 2$) to pay off the loan at the end of the $6\frac{1}{2}$ years. Which source is the more economical to the borrower? *Ans.* (.0721, $m = 12$); (.0791, $m = 12$).

4. A $100 share in a building and loan association matures at the end of 84 months after 84 instalments of dues of $1 each. The association charges 6%, payable monthly in advance, on loans. A borrower can obtain a loan elsewhere at (.05, $m = 12$) and accumulate a sinking fund at (.07, $m = 12$) to retire the loan at the end of 7 years. By how much does the monthly expense differ in the two optional methods and what are the corresponding amortization rates?

5. An association loans $5,000, on which the borrower must pay interest monthly in advance at 6%. The association also sells the borrower one hundred $50 shares, on which he pays monthly dues of $75. The shares mature on the 58th payment date by a payment of $52. At what rate of interest may the borrower consider he has amortized his loan? Express the result as an effective interest rate. *Ans.* .0629.

6. B, a shareholder in an association, paid monthly dues of $1 on a $100 share. The share matured by a payment of $.67 at the end of 83 months. **B** also paid $.50 at the beginning of each month as interest on a loan of $100 from the association. A friend offered to lend **B** the money at the nominal rate of 1% less than the amortization rate at which the monthly expense in the association would amortize the loan, provided the remainder of the monthly expense of such a loan was accumulated in a sinking fund to pay off the debt at the end of 83 months.

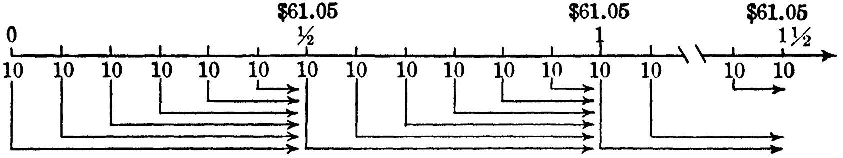
a. What is the least rate which a sinking fund could have offered to make the second choice equitable?

b. Calculate the answer to the question asked in *a* when the loan rate from the friend was 4%, compounded monthly; also $3\frac{1}{2}$%. Interpret your answer. (Use tables to evaluate *b*.)

44. Use of simple interest when payment interval and conversion interval are unequal. Approximations in annuities when $m < p$ are encountered when, in the bookkeeping of an account, simple interest is allowed for fractional interest periods involved. Such cases arise in the share-accumulation plan as still practiced in some organizations. Evaluations arising from these approximations are readily made; the method will be fairly obvious from a diagram. An illustration will show the steps in the procedure.

If the dividend rate of a building and loan association is 6%, compounded semiannually, and dues on the investor's shares are $10 per month, then his first payment is credited with simple interest for 6 months, his second payment is credited with simple interest for 5 months, the next one for 4 months, and so on, his last payment of the conversion interval being at interest for only one month. The total simple interest for the 6 months will be, therefore, interest on $10 at 6% for 21 months (i.e., $6 + 5 + 4 + 3 + 2 + 1$); that is, $\$10 \times .06 \times \frac{21}{12} = \$1.05$. The six $10 payments plus the $1.05 interest may be replaced, therefore by a single payment of $61.05

at the *end* of the conversion interval. In a diagram this discussion may be presented thus:



It should be noted that in replacing the annuity pictured below the line — i.e., $10 at the *beginning* of each month — by the one above the line — i.e., $61.05 at the *end* of each six months — the $61.05 does *not* include the $10 payment made on that same date.

If the payment interval for dues and the association's dividend payment interval coincide, then the question just discussed does not, of course, arise.

A share in a building and loan association is usually matured at the first date for the payment of dues on which the accumulation, with or without a payment, equals or exceeds the face value of the shares. For instance, the book value of a $100 share in an association where the dividend rate is 6%, compounded semiannually, and where the dues are $1 per month, is $99.56 just after the 81st payment is made. The share matures, therefore, on the 82d payment date without even a partial payment at that time, since the interest alone is more than sufficient to bring the book value up to the face value by the end of the period.

Example. An investor pays $40 quarterly dues on a $1,000 share in a building and loan association whose dividend rate is 5%, compounded semiannually. When will the share mature, and what payment, if any, will be necessary at that time?

Solution. The semiannual payment corresponding to quarterly dues of $40 is $\$80 + \frac{40(6+3).05}{12} = \$81.50$. From the solution of the equation $81.50 s_{\overline{2n}|.025} = 1000$ we find n to be 5.42 years. The value of n being greater than 5¼ does not mean, however, that the share matures later than that date. It only means that the equivalent semiannual payment of $81.50 is more than sufficient to mature the shares at 5¼ years. Obviously the amount at interest after the dues are paid at 5 years ($953.076 plus simple interest for one quarter) will make it unnecessary to make a full payment on the next payment date to mature the shares. Denoting the partial payment at 5¼ years by fR, we have

$$fR = 1000 - [953.076(1 + .05\tfrac{3}{12})] = \$35.01.$$

EXERCISES

1. An association charges $2 monthly dues on a $100 share and pays dividends at 6%, convertible semiannually.

a. Find the book value of the investor's account at the end of 3 years on 10 shares, if simple interest is used for fractional interest periods.

b. How much less would the answer to (*a*) have been had interest been calculated at (.06, $m = 2$) on all payments?

Ans. a, \$789.79; *b*, \$.05.

2. An association charges \$.50 per \$100 share monthly as dues. Dividends are to be computed monthly at the rate (.06, $m = 12$).

a. Find the book value of the investor's account just after he makes his 80th payment on 25 shares.

b. How long does it take for such shares to mature and what final payment, if any, is necessary on the date of maturity?

3. A shareholder pays \$75 cash for a \$100 share, which is to mature at some future date by the accumulation of dividends. The income of the association for the next 10 dividend periods permits dividends at the following rates for these respective periods: .031, .033, .033, .031, .029, .028, .029, .027, .029, and .030.

a. Find the value of the account at the ends of the 9th and 10th periods respectively.

b. The average of the first 9 rates and the average of the first 10 rates are each 3%. Could one as well calculate the value of the account at the ends of these periods by using $75(1.03)^9$ and $75(1.03)^{10}$ respectively? Check your answer to several decimal places.

Ans. a, \$97.86; \$100.79.

4. **A** pays \$1 per month for 80 months on each \$100 share in a building and loan association. At the beginning of the 81st month a payment of \$.68 is necessary to mature a share. At what rate (j, $m = 12$) may **A** consider the association has allowed interest on the investment?

5. Dividends are paid quarterly at a nominal rate of 6% in a certain association. Monthly payments of \$1.25 are charged as dues on each \$100 share.

a. How many full payments of \$1.25 are necessary to mature a share?

b. What final partial payment is necessary at the next regular payment date?

Ans. a, 67; *b*, \$39.

6. An association pays dividends on January 1 and on July 1. **A** buys 50 shares on February 1. Dues are \$1.50 per month on each share. At the next dividend date the association distributes dividends amounting to \$6,437.83 on shares whose book value is \$203,426.76.

a. What is **A**'s share of the profit?

b. What has been the yield rate for this dividend period?

7. A building and loan association sells shares of \$50 each to investors for monthly dues of \$.75. If dividends are paid at the rate (.06, $m = 2$), when will shares mature and what final partial payment will be necessary to complete payment on each share? *Ans.* At the end of the 57th month; \$.51.

8. A \$100 share in an association in which the monthly dues are \$1.50 matures on the 52d payment date by a payment of \$.70. If dividends are calculated annually, what rate may the investor consider he has made on his investment?

9. Dues of \$1.30 a month are paid on a \$100 share in a building and loan association whose dividend rate is 7% annually. When will such a share mature and what will be the final partial payment? *Ans.* At 5 years and 3 months, with full payment on that date.

CHAPTER VI

VALUATION OF BONDS

45. Introduction. A study of bonds constitutes the third successive chapter on debt retirement. The problems treated in these chapters are increasingly from the standpoint of the investor, and bonds are considered primarily as an investment problem. This form of *written promise to pay a certain sum at some future date, and to pay periodic interest in the meantime, in return for a loan,* constitutes a very large item in presenting investment opportunities to the investing public.

The attractiveness of a bond offering is largely determined by the following considerations:

1. The rate of income which the investment will yield.
2. The security of the investment, as evidenced by the results of an investigation of the issuing company's ability to make the payments called for in the contract when due.
3. The length of time for which the bonds are issued.
4. Whether the bonds are of such a nature as to make them readily marketable in case the investor should need to sell them.
5. The stability of the bonds as reflected in the particular business which the issuing company conducts.

Of these considerations only the first presents a problem for mathematical treatment. This problem is most easily approached, however, by first carrying out other and more simple problems of bond valuation.

46. Terminology and notation. In more specific terminology a *bond* is a written contract to pay for each unit of *principal, or face value,* a fixed *redemption price* at some future *redemption or maturity date,* and to pay *dividends periodically* on the *face value* at a given dividend rate for the duration of the contract. Dividends are usually paid upon the presentation of the *dividend coupons* attached to the bond.

A bond which is to be redeemed at its face value is said to be *redeemed at par*; otherwise the redemption price is stated as a given per cent of the face value. For instance, we say that a bond is redeemed at 102 if at redemption \$102 is paid for every \$100 of principal.

The rate of interest which the purchaser of a bond makes on his investment is called the *investment rate* or *yield rate.*

A bond is said to be bought *at a premium* or *at a discount* according as the price paid is greater than or less than the face of the bond. Symbolically a discount is a premium which is negative.

The additional terminology necessitates additional notation to facilitate mathematical treatment:

Let P = the bond price n years before maturity.
F = the face value of the bond.
C = the sum at which the bond is redeemed.
$P' = P - F$ = premium (discount, if negative) paid for a bond.
$E = C - F$ = excess (positive or negative) of maturity value over face value.
g = nominal dividend rate, convertible m_1 times per year.
j = nominal yield rate, convertible m_2 times per year.

Other symbols have the same meanings as previously used.

47. Price of a bond. The purchaser of a bond buys just two things: (1) the annuity formed by the dividends and (2) the redemption value that is to be delivered to him at the end of n years. Since the price which the purchaser is willing to pay represents the value of these two things to him, these two items must be evaluated at the rate which the purchaser is to make on the investment. Hence the price of any bond may always be stated as

[53] **Price = (present value of annuity formed by dividends) + (present value of redemption price),**

both evaluated at the investor's rate, j. This simple statement is the basis of all bond evaluation, and, assuming periodic dividends throughout the duration of the bond, the price n years before maturity is readily expressed as

$$P = F\cdot g\cdot {}^{(m_2)}a^{(m_1)}_{\overline{n|}j} + C\cdot\left(1+\frac{j}{m_2}\right)^{-m_2 n}. \tag{54}$$

The student should by this time be able to set up and to evaluate problems which involve only present values as expressed in [53], whatever be the variations in m_1, m_2, n, etc. It is important, however, to see how much more simply the problem can be set up for numerical computation. The conversion period for computing both the dividends and the yield on investment are almost invariably made on the same time basis, that is, with $m_1 = m_2$. If, in formula [54], m_1 is taken equal to m_2, and C is expressed as $E + F$, a very convenient form for computing the premium is readily found. Thus

$$P - F = [F\cdot g\cdot {}^{(m)}a^{(m)}_{\overline{n|}j} + (E+F)(1+j/m)^{-mn}] - F.$$

$$P' = F\cdot\left[\frac{g}{m}\times\frac{1-(1+j/m)^{-mn}}{j/m} + \left(1+\frac{j}{m}\right)^{-mn} - 1\right]$$
$$+ E\left(1+\frac{j}{m}\right)^{-mn},$$

or
$$P' = F \cdot \left[\frac{g}{m} \times \frac{1-(1+j/m)^{-mn}}{j/m} - \frac{j}{m} \times \frac{1-(1+j/m)^{-mn}}{j/m}\right] + E\left(1+\frac{j}{m}\right)^{-mn},$$

or

$$P' = F \cdot \left[\frac{g-j}{m}\right] \cdot a_{\overline{mn}|j/m} + E\left(1+\frac{j}{m}\right)^{-mn}. \qquad [55]$$

From the nature of the numbers in this formula one is ordinarily able to perform the numerical computation mentally, without the aid of logarithms or computing machines. Obviously, if bonds are redeemed at par, then $E = 0$, and the last term of the formula, $E\left(1+\frac{j}{m}\right)^{-mn}$, is zero also.

Example. A \$10,000 issue of 6% bonds, paying dividends semiannually, is to be redeemed at 98 at the end of 10 years. What can an investor afford to pay for the entire issue if he desires to make 7% semiannually on his investment?

Solution. Here E is negative (\$9,800 − \$10,000), and, since the investor's rate is larger than the dividend rate, the factor $g - j$ will likewise be negative. The premium which the purchaser can afford to pay is, then,

$$P' = 10{,}000\left(\frac{.06-.07}{2}\right) \cdot a_{\overline{20}|.035} - 200(1.035)^{-20} = -\$811.13.$$

Since this premium is negative, the corresponding purchase price will be at a discount of \$811.13. The price is therefore \$10,000 − \$811.13, i.e.,

$$P = \$9{,}188.87.$$

EXERCISES

1. Find the purchase price in the illustrative example above if the maturity value were 102 instead of 98. *Ans.* \$9,389.89.

2. A 6% bond issue, paying dividends semiannually, is sold 10 years before maturity to yield the investor 5% semiannually. If the bonds are redeemed at 98, what price per \$1,000 will the purchaser be required to pay?

3. Another convenient form for P', well adapted to numerical computation, is

$$P' = (C - F) + \left(\frac{F \cdot g - C \cdot j}{m}\right) \cdot a_{\overline{mn}|j/m}.$$

Derive this formula.

4. Use the formula of Ex. 3 to solve the illustrative example above.

5. Bonds with a total face value of \$40,000 are issued in denominations of \$1,000. Dividends are to be paid twice a year at a nominal rate of 7%. The entire issue is to be redeemed at 15 years at 101.

a. Find the price per \$1,000 if sold to yield the investor 6%, compounded semiannually.

b. What total amount of money is the issuing company able to raise if the entire issue is sold immediately?

c. On the same yield basis, for how much would the bonds sell $1\frac{1}{2}$ years before maturity?

Ans. b, \$44,084.88; *c,* \$40,931.78.

6. If $m_1 = m_2$, and if, instead of computing dividends on F at a rate g, they are computed on C at a rate g', such that $g'C = gF$, show that the price of a bond may be expressed as

$$P = K + \frac{g'}{j}(C - K),$$

where K is the present value of the redemption price.

(This formula is called *Makeham's Formula,* after the well-known English actuary of that name.)

7. Using Makeham's Formula given in Ex. 6, evaluate the data of the illustrative example, thus checking the illustrative solution.

8. A \$1,000 bond, redeemable at par, pays dividends of \$25 each 6 months. The price is set to yield the investor 6% semiannually. Find the price if the bonds mature at (*a*) the end of 10 years, (*b*) the end of 8 years, (*c*) the end of 5 years.

9. Six-per-cent bonds of \$1,000 denomination pay dividends semiannually and are to be redeemed at the end of 12 years. The yield to the investor is to be (.05, $m = 2$). What must be the price if the bonds are (*a*) redeemed at 97? (*b*) redeemed at 100? (*c*) redeemed at 103? *Ans.* (*a*) \$1,072.84, (*b*) \$1,089.42, (*c*) \$1,106.01.

10. Bonds to the amount of \$30,000 will pay \$300 dividends at the end of each quarter for the next 15 years. The bonds are to be redeemed at that time at 105. What maximum price can an investor afford to pay for these bonds on the day of issue if he has to make 6%, compounded quarterly, on his investment?

11. For each \$1,000 of face \$30 in dividends are paid each 6 months. The bonds are to be redeemed at par at the end of 8 years. Find the price on date of issue: (*a*) to yield 5%, compounded semiannually; (*b*) to yield 7%, compounded semiannually. *Ans.* (*a*) \$1,065.28, (*b*) \$939.53.

SUPPLEMENTARY EXERCISES

12. A \$1,000 bond issue is to be redeemed in 15 years at 101. The dividend rate stated in the bond is (.06, $m = 2$). What price can an investor afford to pay if he wishes to make 7% effective on his investment?

13. **A** is considering the exchange of a certain investment which is paying him 6%, compounded monthly, for bonds which offer semiannual dividends at 8%. The bonds are issued in denominations of \$1,000, to be redeemed at par at the end of 8 years. What is the highest price which **A** can pay per \$1,000 to keep the exchange equitable? *Ans.* \$1,120.52.

14. Bonds of \$100 denomination are issued, to pay dividends annually at 7%. The maturity value 3 years hence is 97. What will a purchaser of 25 of these bonds be willing to pay if he is satisfied to make (.04, $m = 2$) on his investment?

15. A \$10,000 bond issue will be redeemed at 105 at the end of 12 years. The issuing company, recently organized, will pay its first dividends at the end of 2 years and will pay dividends at 6%, compounded semiannually, thereafter during the life of the bond. An investor will buy the entire issue, provided he can buy at such a price as will ensure him 8%, compounded semiannually, on his investment. What maximum price can he afford to pay? *Ans.* \$7,837.84.

16. A company issues bonds, paying 6%, compounded semiannually, which are redeemed at par not later than 12 years from date of issue, and which may be redeemed at any dividend date on or after the 8th year. What price per \$1,000 can the investor afford to pay if he is to realize (*a*) 5%, converted twice a year? (*b*) 6%, converted twice a year? (*c*) 7%, converted twice a year?

48. Amortization of premium. An investor who pays more for a bond than he is to be repaid for it at maturity receives, each dividend period, dividends exceeding in amount that which is necessary to pay the required yield on investment for that period. This excess in dividends is used to amortize the excess in price (above the redemption price) which he has paid. The successive *book values,* thus obtained, are equivalent to the purchase prices on the successive dividend dates. The proof of this statement is readily shown, for at any nth year before maturity

$$
\begin{aligned}
\textit{Price}-\textit{amortization} &= P-\left(F\cdot\frac{g}{m}-P\cdot\frac{j}{m}\right)\\
&= P+P\cdot\frac{j}{m}-F\cdot\frac{g}{m}\\
&= P\left(1+\frac{j}{m}\right)-F\cdot\frac{g}{m}\\
&= \left[F+F\left(\frac{g-j}{m}\right)\cdot a_{\overline{mn}\rceil j/m}+E\left(1+\frac{j}{m}\right)^{-mn}\right]\left(1+\frac{j}{m}\right)-F\cdot\frac{g}{m}\\
&= \left[F+F\cdot\frac{j}{m}+F\left(\frac{g-j}{m}\right)(1+a_{\overline{mn-1}\rceil j/m})+E\left(1+\frac{j}{m}\right)^{-mn+1}\right]\\
&\qquad -F\cdot\frac{g}{m}\\
&= F+F\left(\frac{g-j}{m}\right)\cdot a_{\overline{mn-1}\rceil j/m}+E\left(1+\frac{j}{m}\right)^{-(mn-1)},
\end{aligned}
$$

which is the price on the following dividend-paying date.

This procedure is known as the *amortization of premium,* although it is evident that only that part of the premium which is in excess of the redemption price is amortized.

Example. On May 1, 1944, A buys bonds to the amount of \$10,000, which are to be redeemed at 102 on May 1, 1947. Dividends of \$300 are payable on each May 1 and November 1. Find the price, and set up a schedule showing the amortization of premium if the bonds are bought to yield 5%, converted semiannually. Check independently the book-value entry on May 1, 1946.

Solution. The price of the bond, as found by the premium formula, is

$$P' = 10{,}000 \cdot \left(\frac{.06 - .05}{2}\right) \cdot a_{\overline{6}|.025} + 200(1.025)^{-6} = 447.866.$$

$$\therefore P = \$10{,}447.866.$$

Investment Schedule

Date	Interest at 5%	Periodic Dividends	For Amortization	Final Book Value
May 1, 1944				\$10,447.866
November 1, 1944	\$261.197	\$300	\$38.803	10,409.063
May 1, 1945	260.227	300	39.773	10,369.290
November 1, 1945	259.232	300	40.768	10,328.522
May 1, 1946	258.213	300	41.787	10,286.735
November 1, 1946	257.168	300	42.832	10,243.903
May 1, 1947	256.098	300	43.902	10,200.001

An independent check on the book value on May 1, 1946, is readily given by any of the formulas for the price, since the price and the book value (B.V.) on a dividend date are the same. Hence

$$\text{B.V.} = P = 10{,}000 + 10{,}000 \cdot \left(\frac{.06 - .05}{2}\right) \cdot a_{\overline{2}|.025} + 200 \cdot (1.025)^{-2} = \$10{,}286.74.$$

In setting up an investment schedule in which the value m_2, associated with the yield rate, is different from the value m_1, associated with the dividend rate, use an equivalent yield rate, convertible m_1 times per year, and make schedule entries on all payment dates.

EXERCISES

1. Bonds which pay dividends twice a year at 4½% are sold to yield the investor 4%, compounded semiannually. Find the price per \$1,000 of face if the bonds are to be redeemed at par at the end of 4 years. Prepare an amortization schedule for such a bond. *Ans.* \$1,018.31.

2. A \$1,000 bond which has 2½ years yet to run is to be redeemed at 95. Dividends of \$35 are paid each 6 months.

a. What price can a buyer afford to bid who wishes to make $(.06, m = 2)$ on his investment?

b. Set up a schedule for the amortization of the premium.

c. Without use of the bond schedule, find the book value of the bond at the end of one year.

3. Assuming $m_1 = m_2 = m \neq 1$ for all conversion periods involved, prove that the amount available for amortization (see Section 49) for the kth $(k = mn)$ period before maturity of a bond is $\frac{Fg - Cj}{m}\left(1 + \frac{j}{m}\right)^{-k}$.

4. Using a formula from Ex. 3, reproduce the entries of column 4 (*For Amortization*) of the schedule on page 102. (With a calculating machine each successive entry may be obtained very rapidly by setting up $\left(1 + \frac{j}{m}\right)^{-1}$ in the machine and using as the multiplier each time the result of the previous multiplication.)

5. A \$10,000, $6\frac{1}{2}\%$ bond, paying dividends semiannually, is bought to yield $(.06, m = 2)$. The book value on a given dividend date is \$10,144.19. On the next dividend date, (*a*) what part of the dividend is used for amortization of premium? (*b*) what is the new book value? *Ans.* (*a*) \$20.67, (*b*) \$10,123.52.

6. Dividends of \$30 for each \$1,000 of face are paid at each 6-months interval to an investor who bought bonds to yield 5%, convertible semiannually. On a given dividend date the book value was recorded as \$1,023.23. Find the book value 6 months later.

7. Set up the first three lines and the last three lines of the investment schedule for the bond of Ex. 5 of page 99.

8. Set up a bond schedule for the bond of Ex. 13, page 101, showing the progress of amortization for the first 3 years.

49. Accumulation of discount. Many bonds are sold at a price less than that which the investor is to be repaid at maturity. The dividends received in this case are insufficient to pay the required yield on investment, that is, $P \cdot \frac{j}{m} > F \cdot \frac{g}{m}$. The difference here may be thought of as being a further investment in the bonds to be returned, with interest, at the time of redemption. The difference between the dividends and required yield on investment is therefore added to the book value (price) of the previous dividend date for a new book value, namely, $P + \left(P \cdot \frac{j}{m} - F \cdot \frac{g}{m}\right)$. Comparing this algebraic expression with that of the preceding section, we see that it is, as before, equivalent to the price at which the bonds must sell on the next date to yield the investor j at m.

Example. An investor buys bonds whose face value is \$10,000. The bonds bear yearly dividend coupons of \$500 each, and they are to be redeemed 8 years hence at 110. Find the price to yield the investor 5%. Set up the bond schedule showing the accumulation of discount.

Solution. Computing the price by the premium formula, we have
$P' = 10{,}000 \cdot (.05 - .05) \cdot a_{\overline{8}|.05} + 1000 \cdot (1.05)^{-8} = 0 + 1000 \cdot (.67683936)$.
$\therefore P = \$10{,}676.839$.

Investment Schedule

End of Year	Interest at 5%	Periodic Dividends	For Accumulation of Discount	Final Book Value
0				$10.676.839
1	$533.842	$500	$33.842	10 710.681
2	535.534	500	35.534	10,746.215
3	537.311	500	37.311	10,783.526
4	539.176	500	39.176	10,822.702
5	541.135	500	41.135	10,863.837
6	543.192	500	43.192	10,907.029
7	545.351	500	45.351	10,952.380
8	547.619	500	47.619	10,999.999

The procedure here, similar to that of the preceding section, is known as the *accumulation of discount.* The purchase price of the bond chosen for illustration is at a premium (as compared with the face), but less than the maturity value, and hence the purchase price must be "written up" or accumulated to become equal to the redemption value. In like manner, amortization of premium is necessary when the purchase price is greater than the redemption value, even though the purchase price may be at a discount. The confusion in current terminology, however, is clarified by visualization of the investment schedule.

It is to be noted that from the book value (price) on any given dividend date the book value on the next succeeding dividend date is given (both in the case of amortization of premium and in the accumulation of discount) by the expression $P + \left(P \cdot \frac{j}{m} - F \cdot \frac{g}{m}\right)$. This expression may obviously be written in the form $P \cdot \left(1 + \frac{j}{m}\right) - F \cdot \frac{g}{m}$. If, then, P_0 and P_1 denote, respectively, the prices of a bond at the beginning and at the end (before the dividend coupon has been removed) of a dividend period, then

[56] $$P_1 = P_0 \cdot \left(1 + \frac{j}{m}\right)^1.$$

EXERCISES

1. A $1,000 bond, paying a $25 dividend each 6 months, is bought $2\frac{1}{2}$ years before maturity to yield the investor (.06, $m = 2$). The bond is to be redeemed at par. Prepare a schedule showing the accumulation of discount.

2. According to formula [56] the expression given by formula [54], accumulated for one interest period at the investor's rate, less one dividend, should give the price on the following dividend date. Prove this relation algebraically.

3. In the illustrative schedules of Sections 47 and 48, check the relation between the third and fourth book-value entries by the method of Ex. 2.

4. Set up the first three lines and the last three lines of the investment schedule for the bond of Ex. 10, page 100.

5. A \$10,000 bond, with dividends at 5%, payable semiannually, is bought to yield (.06, $m = 2$). The book value on a given dividend date is \$9,814.13. On the next dividend date, in the bookkeeping of the investor, (*a*) what principal is entered as repaid? (*b*) How much interest is entered as received from the bond? *Ans.* (*a*) \$44.42, (*b*) \$250.00.

6. Bonds with a face value of \$40,000 pay monthly dividends at a nominal rate of 6%. Redemption is 10 years hence, at 105. An investor buys the entire issue at a price that will permit a yield of 6%, compounded monthly. Set up the first four lines of the investment schedule for these bonds.

7. A company is raising \$100,000 by a bond issue which is to be sold at face value and redeemed 20 years later at 102.

a. For what amount must the dividend coupons be printed if the bonds are to be sold at a price that will yield the investor 5%?

b. Give the investment-schedule entries to be made at the end of the 15th year.

Ans. a, \$4,939.52; *b*, $V_{14} = \$101{,}185.42$.

50. Bonds bought between dividend dates. When bonds are bought at one price and redeemed at another, the periodic adjustments to book value made on successive dividend dates, as shown in the investment schedules, are in compliance with the so-called fundamental business principle that capital must not be impaired. Specifically, interest is continually accruing on the book value at the investor's rate, and dividends are continually accruing on the face value of the bond at the dividend rate; and one may make adjustments more frequently than at the end of interest conversion intervals if desired, as, for instance, in the case of inventories, resale, auditing, etc. It is therefore necessary to define more exactly both the price and the book value on a date not coinciding with an interest conversion date.

The price, as a matter of fact, is exactly defined *on any date* by formula [53], page 98. The evaluation of formula [53], however, when fractional interest periods are involved, is most easily accomplished by expressing the price on the date in question in terms of the price on a regular dividend date, either on the previous one or on the ensuing one. The argument embodied in setting up formula [56] makes this possible. We therefore define the *true price* of a bond bought on a date $n - t$ years before maturity, mn being integral and $t < \frac{1}{m}$, as

$$\text{[57]} \qquad \textbf{True price} = P_n \cdot \left(1 + \frac{j}{m}\right)^{mt},$$

where P_n denotes the price at n years, the last regular dividend date.

In practice some approximate method is used to evaluate formula [57]. (See Ex. 3 on page 108.) Probably the most common practice, and the one which we shall use in this text, is to use simple interest for the fractional interest period involved. One has immediately, then,

[58] $$\text{Approximate price} = P_n \cdot (1 + j \cdot t).$$

Unless otherwise specified, the price shall always mean the approximate price.

Example. Find the price on July 1, 1944, of a \$10,000, 6% bond to be redeemed at 102 on May 1, 1946, if the investor is to realize 5% on his investment. All interest rates are convertible semiannually. (See illustrative example and schedule of Section 48.)

Solution. It is desired to find the price 2 years, lacking 2 months, before maturity; hence

$$P = [10{,}200 \cdot (1.025)^{-4} + 300 \cdot a_{\overline{4}|.025}] \cdot [1 + .05 \times \tfrac{2}{12}] = \$10{,}455.701.$$

The *book value* of a bond on any date is defined as the *price on that date less the accrued dividend.*

From the above definition it is seen that the *price* and the *book value* are *equal only on dividend payment dates,* immediately after the dividends have been paid. Furthermore, directing our attention to the investment schedule, we see that if entries are desired between dividend dates, the computations (using simple interest) would be made in exactly the same manner as those on the regular dividend dates, namely, by adding to the last book-value entry (or subtracting if bought above the redemption price) the difference between the dividends for the fractional period and the interest on investment for this same period, each calculated at simple interest. Expressed algebraically, we have

$$\text{B.V.} = P - F \cdot gt = P_n(1 + j \cdot t) - F \cdot gt,$$

or

[59] $$\text{B.V.} = P_n + (P_n j - F \cdot g)t.$$

In the illustrative example just cited above, the book value on July 1, 1946, would be

$$\text{B.V.} = \$10{,}455.701 - 10{,}000 \times .06 \times \tfrac{2}{12} = \$10{,}355.701.$$

Since the price of a bond is reduced by the amount of the dividend payment at the time a dividend is paid, it would be only natural, as is done in practice, always to *quote bonds at their book value*; otherwise such a large fluctuation in price overnight (following a dividend payment) might create suspicion on the part of the prospective buyer. The actual price between dividend payment dates is therefore

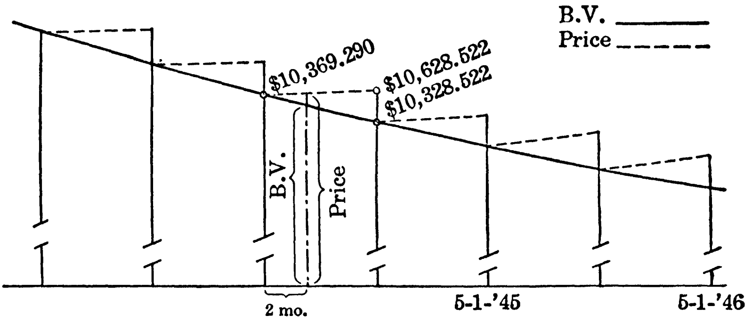
[60] **Price = (quotation) + (accrued dividend).**

It is to be noted that both the expressions for the price, [58], and the B.V., [59], are linear in t; that is, the graphs are represented by straight lines from one interest-payment date to the next. Hence the value of either may be readily found on any intermediate date by ordinary straight-line interpolation. For the price and the book value computed above we would have by interpolation

$$P = \$10{,}369.290 - \tfrac{1}{3}(10{,}369.290 - 10{,}628.522) = \$10{,}455.701,$$

and $$\text{B.V.} = \$10{,}369.290 - \tfrac{1}{3}(10{,}369.290 - 10{,}328.522) = \$10{,}355.701.$$

A graphical representation of the facts which we have just been discussing would appear somewhat as shown below. (For emphasis, scalar relations have not been preserved.)



If the book value is calculated for some intermediate date, subsequent book values at intervals of one dividend period from this date may be obtained by the usual method of extension of an investment schedule, that is, by adding to (or subtracting from) the previous entry made at the intermediate date the difference between the yield and the dividend for one period. This is particularly important from the bookkeeping standpoint.

EXERCISES

1. In the morning paper of May 1, 5% bonds, paying dividends on March 1 and on September 1 of each year, were quoted at 98½. What was the price per $1,000 on that date? *Ans.* $993.33.

2. On April 6 of each year annual dividends at 5% were paid on a $1,000 bond. An investor bought the bond for $994 on the last dividend date, to yield 6% effective. On this basis what was the book value, and also the price, on June 17 of the same year?

3. Three other methods, often used in practice, for finding the approximate price of a bond bought between dividend dates may be stated by the following formulas*:

$$\textit{Approximate price} = \begin{cases} (1)\ P_n + F \cdot g \cdot t \cdot \left[1 - j\left(\dfrac{1}{m} - t\right)\right] \\ (2)\ P_n + P_n \cdot j \cdot t \cdot \left[1 - j\left(\dfrac{1}{m} - t\right)\right] \\ (3)\ \left(P_{n-1} + F \cdot \dfrac{g}{m}\right)\left[1 + j\left(\dfrac{1}{m} - t\right)\right]^{-1} \end{cases}$$

Using the data: A $1,000,000 issue of 5% bonds, to be redeemed at par September 1, 1954, with half yearly coupons on March 1 and September 1, are bought on November 1, 1944, to yield 6%, convertible semiannually,

a. Find both the *true price* and the approximate price by the method of the previous paragraph.

b. Find the approximate price by each of the three formulas just stated, and note the variation in the price obtained by the different methods.

Ans. a, $934,777.70; $934,868.75; *b,* $933,779.29; $934,683.67; $934,687.26.

4. With the aid of a diagram, interpret each of the approximate formulas (1), (2), and (3) given in Ex. 3.

5. The book values of a bond on two successive dividend dates, July 1, 1944, and January 1, 1945, were $981.19 and $985.72 respectively. If dividends are calculated at a nominal rate of 6%, determine both the price and the book value on November 1, 1944. *Ans.* $1,004.21; $984.21.

6. If 4% bonds, paying quarterly dividends, are to be priced to yield the investor 6%, payable quarterly, by what amount will the price increase each day throughout the quarter following a date on which B.V. $= P =$ $985.44?

7. A 5% bond, face value $10,000, maturing March 1, 1951, with dividends payable March 1 and September 1, is sold August 1, 1945, at a price to yield the investor (.06, $m = 2$).

a. Find the selling price.

b. By how much does the price differ from the "true price"?

Ans. a, $9,739.86; *b,* $.59.

8. A $100, 7% bond, with annual dividends, is redeemable at par on June 1, 1948. Find the market quotation April 1, 1944, to yield the investor 6%.

9. Bonds of $30,000 face value are to be redeemed at 102 on May 1, 1946. Dividend coupons of $1,320 each are attached, one for each half year for the duration of the bonds. The entire issue was bought to yield (.06, $m = 2$). The investor audits his books at the beginning and at the middle of each year. Make up an investment schedule with entries on January 1, 1945, and each 6 months thereafter, plus an entry on the maturity date. *Ans.* B.V. 1–1–1945, $31,614.47.

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* McKinsey, *Interest and Bond Values.* University of Toronto Press.

10. The books of a company are to be audited on July 1. The company presents the following information on its bond holdings:

F	(g, m)	(j, m)	Last Dividend Date	B.V. on Last Dividend Date
$10,000	.05, 2	.06, 2	June 1	$9,777.98
10,000	.05, 2	.04, 2	Feb. 1	10,182.69
8,000	.06, 2	.04, 2	Apr. 1	9,072.67
32,000	.05, 2	.05, 2	May 20	32,537.62
15,000	.04, 2	.07, 2	May 1	13,674.45

a. What entry should be made in the books of the investor for the total book value on bonds as of July 1?

b. By how much does this differ from the sum of the various book values on their last dividend dates?

51. Estimation and determination of the yield rate. It is usually not the investor's privilege to set the price which he is willing to pay for bonds available on the market. The price, or quotation, together with a description of the bond, is usually given, and it is up to the investor to determine what rate he will be making if he invests at the price asked. The determination of the yield rate thus becomes, from the standpoint of the investor, one of the most important mathematical problems associated with bonds.

As a basis for determining the yield rate j the fundamental relations [54] and [55], relating j to F, C, g, m, and n, do not, in general, lend themselves to a direct solution. However, a glance at the investment schedule on page 104 suggests a method of obtaining a very good approximation to the yield rate.

Since the rate of interest per year on an investment is found by dividing the amount of interest earned in a year by the principal invested, we shall obtain a very good approximation to the *yield rate* of a bond if we *divide the average annual income by* the *average annual investment.* These are readily found. The successive amounts listed in the book-value column show that, although the amount on which the yield is computed gradually changes from period to period, the arithmetic average of the first and last entries in that column, $\frac{1}{2}[(\text{B.V.})_1 - (\text{B.V.})_n]$, is a very good approximation to the average annual investment during the life of the bond. Also, the difference between these two schedule entries, divided by the time (accurate to one twelfth of a year) over which this difference has occurred, is approximately the annual amount by which the investor's income from his investment differs from the dividends stipulated in the bond. If more is paid for the bond than the investor is to get back on redemption, and vice versa, the approximate annual income may always be expressed as

$F \cdot g - \frac{(\text{B.V.})_1 - (\text{B.V.})_n}{n}$. The approximate yield of a bond will therefore be defined as

$$[61] \qquad j = \frac{F \cdot g - \dfrac{(\text{B.V.})_1 - (\text{B.V.})_n}{n}}{\dfrac{(\text{B.V.})_1 + (\text{B.V.})_n}{2}},$$

where, for many cases under consideration, $(\text{B.V.})_1$ and $(\text{B.V.})_n$ will obviously be P and C respectively. (The notation for the rate, j, is retained, since as such it satisfies the condition for the accuracy desired by the use of this approximation.)

An illustration of the above discussion is most easily followed from an investment schedule. Consider the illustrative schedules of Sections 48 and 49, and assume as given the values of P, F, C, g, m, and n. From these we wish to determine the value of j. In the two examples we should have, respectively, the following results:

Approximate	Page 102	Page 104
Annual investment	$\frac{10{,}447.866 + 10{,}200}{2} = \$10{,}323.933$	$\frac{10{,}676.839 + 11{,}000}{2} = \$10{,}838.420$
Annual income	$600 - \frac{217.866}{3} = \$517.378$	$500 - \frac{-323.161}{8} = \$540.395$
Yield rate	$\frac{517.378}{10{,}323.933} = .050+$	$\frac{540.395}{10{,}838.420} = .050-$

This method does involve several approximations, but is found, in general, to give the nominal rate with reliability to three decimal places. If greater accuracy is desired, the approximate rate serves as an excellent basis for choosing the two rates best suited to carrying out the interpolation with the aid of the relations [54] and [55]. We illustrate the more accurate determination, keeping in mind that each interpolation will give only two additional places of accuracy.

Example. A 5% bond with dividends, payable semiannually, is redeemed in $7\frac{1}{2}$ years at 103. Find the yield rate to six decimal places if bought at 95.

Solution. First determining the approximate yield rate, we have

$$j = \frac{100(.05) - \dfrac{95 - 103}{7.5}}{\dfrac{95 + 103}{2}} = .061.$$

This would indicate that the correct yield rate is between .06 and .07, the two nearest tabulated rates. Calculating the prices at these respective rates, one finds

$$P = 103(1.03)^{-15} + 2.5 \times a_{\overline{15}|.03} = \$95.956,$$

and

$$P = 103(1.035)^{-15} + 2.5 \times a_{\overline{15}|.035} = \$90.273.$$

Hence, interpolating for two further decimal places, we have

	$\frac{j}{2}$	p	
	.03	95.956	
x	?	95.	956
.005	.035	90.273	5683

$$\therefore \frac{j}{2} = .03 + .005 \times \frac{956}{5683} = .0308$$

The value of $\frac{j}{2}$ from this interpolation appears to be between .0308 and .0309. Hence we calculate the price at each of these two rates, with the results as shown in the table:

	$\frac{j}{2}$	p	
	.0308	95.0192	
x	?	95.	192
.0001	.0309	94.9028	1164

$$\therefore \frac{j}{2} = .0308 + .0001 \times \frac{192}{1164} = .030816$$

The yield rate is therefore ($j = .061632$, $m = 2$).

NOTE. Bond tables are available in which the yield rate is tabulated to several decimal places for bonds bought at various prices and for various durations. Such tables are invaluable to an organization handling bonds to any great extent. Sprague's *Bond Tables* (private publication by Chas. E. Sprague, New York) are quite complete. The Financial Publishing Company of Boston also publishes very complete bond tables under the title *Acme Table of Bond Values.*

EXERCISES

1. A \$1,000 bond with coupons at (.06, $m = 2$), redeemable at 101 in 12 years, is bought for \$1,090. Find the yield to the nearest .01%. *Ans.* .0505, $m = 2$.

2. Find correctly to four decimal places the yield rate for each of the following bonds:

	Quotation	Redemption	Dividend Rate	Duration	Yield Rate
a.	115	105	.05, $m = 2$	8 years	j, $m = 2$
b.	92	par	.05, $m = 2$	15 years	j, $m = 2$
c.	120	102	.06, $m = 2$	16 years	j, $m = 2$
d.	110	par	.06, $m = 2$	10 years	j, $m = 2$
e.	95.93	par	.04, $m = 1$	$4\frac{1}{6}$ years	j, $m = 1$

3. A 7% bond issued January 1, 1945, with dividends payable semiannually, to be redeemed at par January 1, 1950, was sold for $1,087.52 on date of issue. Find the approximate yield rate to the purchaser. *Ans.* .050.

4. A $10,000 bond, paying $300 dividends twice a year, issued January 1, 1940, is to be redeemed at par January 1, 1960. **A** buys these bonds, when issued, to yield (.08, $m = 2$). On January 1, 1948, he sells them to **B** at a price which enables **B** to make 6% effective.

a. Determine the price which **B** paid for the bonds.
b. Approximately what rate did **A** make on his investment?

5. A $1,000, 7% bond, with semiannual dividends, is redeemable at par on January 1, 1949. What will be the yield, (j, $m = 2$), if bought January 1, 1944, for $1,088? Compute the rate accurately to four decimal places. *Ans.* .0499.

6. *a.* Find the bid on an issue of $100,000, fifteen-year, 4% bonds, dividends payable semiannually, to yield the investor 7%, compounded semiannually.

b. If an investor made a successful bid of $90,000 for the issue, approximately what rate of yield was made on the investment?

7. A 5% bond issue, with dividends January 1 and July 1, is quoted on April 1 at 99¼ plus accrued dividend. If the bond was worth 99 on the last dividend date, find the yield rate, assuming that it has remained constant during that time. *Ans.* .0606.

8. A 7%, $1,000 bond issued January 1, 1945, dividends payable semiannually, to be redeemed at par January 1, 1950, was sold for $1,085.30. On this basis, what would be the price and also the book value of this bond on June 1, 1945?

9. On November 10, 1940, an investor paid $1,326.70 per $1,000 for 8% bonds with dividends on March 10 and September 10. The bonds are to be redeemed at 110 on September 10, 1952. On March 10, 1946, he was forced to sell the bonds and was able to obtain a price of $1,100. Approximately how much did the early sale change the yield rate from what it would have been had the bonds been held until maturity? *Ans.* 1.8% less.

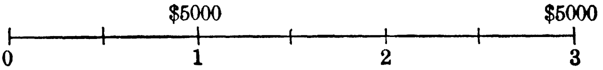
10. A 7%, $5,000 bond, with dividends on October 1 and April 1, and redeemable at par October 1, 1947, was bought on January 1, 1934, for the sum of $5,291.45. Determine the yield rate to four decimal places.

52. Serial bonds. It is often convenient and profitable for a company raising money by a large issue of bonds to retire the debt thus created by *redeeming the bonds in periodic instalments.* Such bonds are called *serial bonds.* They may be treated as several separate bonds combined into a single contract, and hence they may be evaluated by the methods previously presented.

Example. A $50,000 issue of bonds, with semiannual dividends at 6%, are to be redeemed by equal biennial redemptions over a period of 20 years.

Set up the investment schedule for the last 3 years' duration of the bonds on the basis of a yield rate of $(.08, m = 2)$.

Solution.



The price (book value) 3 years before maturity is

$$P_1 = 5{,}000 + 5{,}000\left(\frac{.06 - .08}{2}\right) \cdot a_{\overline{2}|.04} = \$4{,}905.695.$$

$$P_2 = 5{,}000 + 5{,}000\left(\frac{.06 - .08}{2}\right) \cdot a_{\overline{6}|.04} = \$4{,}737.893.$$

$$\therefore P = P_1 + P_2 = \$9{,}643.588.$$

Investment Schedule

Period	Interest at 4%	Dividend at 3%	For Accumulation of Discount	Book Value	Redemptions
0				$9,643.588	0
1	$385.744	$300	$85.744	9,729.332	0
2	389.173	300	89.173	4,818.505	5,000
3	192.740	150	42.740	4,861.245	0
4	194.450	150	44.450	4,905.695	0
5	196.228	150	46.228	4,951.923	0
6	198.077	150	48.077	000.000	5,000

EXERCISES

1. School bonds of face value $20,000, dated November 1, 1945, to bear semi-annual dividends at $5\frac{1}{2}\%$, are to be redeemed at par, $2,000 on November 1, 1954, and $2,000 annually thereafter until all bonds are redeemed.

a. Calculate the bid to yield the investor $(.05, m = 2)$.

b. Set up the first two lines and the last three lines of the investment schedule.

Ans. a, $20,962.840; *b*, $(\text{B.V.})_3 = \$4{,}019.158$.

2. A $1,000,000 highway bond issue, dated January 1, 1944, bearing interest at $(.06, m = 2)$, is to be redeemed, $250,000 on January 1, 1947, and the same amount every 2 years thereafter, until all bonds are redeemed. What is the price to yield the investor $(.05, m = 2)$? Set up the first eight lines of schedule.

3. Show that the solution of Ex. 2 may be expressed in the form

$$P = 1{,}000{,}000 + 250{,}000\left(\frac{.06 - .05}{2}\right)\left[\frac{4 - (1.025)^{-2} \cdot a_{\overline{16}|.025} \cdot s^{-1}_{\overline{4}|.025}}{.025}\right].$$

4. The expression in the brackets in the preceding problem arises from the periodically decreasing annuity involved. (See Section 29.) Show that, in general, if bonds of total face value F are to be redeemed at par in h equal instalments, the redemptions forming an annuity for n years, deferred n' years ($n' \geq 0$), then the price may be expressed as

$$P = F + \frac{F}{h}\left(\frac{g-j}{m}\right)\left[\frac{h - (1+j/m)^{-mn'} \cdot \frac{h}{n} \cdot {}^{(m)}a_{\overline{m}|j}^{(h/n)}}{j/m}\right].$$

5. Check Exs. 1 and 2 by the formula of Ex. 4.

6. A utilities corporation issues bonds to the amount of one million dollars. The bonds are to pay dividends of \$25 per thousand each 6 months and are to be redeemed at par in 5 instalments, the first instalment at the end of 5 years, and similar instalments each 3 years thereafter, until all bonds have been redeemed. What amount of cash is raised if the complete issue is sold to yield the investors (.06, $m = 2$)?

7. Bonds of face value \$25,000, paying dividends at (.06, $m = 2$), are priced to yield the investor 4%, payable semiannually. Redemptions are to be made as follows: \$5,000 at the end of 3 years at 104; \$5,000 at the end of 5 years at 103; \$5,000 at the end of 7 years at 102; \$5,000 at the end of 9 years at 101; and \$5,000 at the end of 11 years at par. What is the cash price of the complete issue? *Ans.* \$28,378.458.

53. Annuity bonds.

All bonds thus far discussed have been redeemable only in denominations of integral multiples of \$100 or of \$1,000. Obviously the debt created by a bond issue might be repaid, principal and interest, by equal periodic amortization payments. Interpreting the amortization schedules of Chapter IV in bond terminology, the periodic redemptions of principal are not equal, nor are they integral multiples of \$100 or \$1,000. Such contracts, drawn up in the form of bonds, are spoken of, therefore, not as serial bonds, but as *annuity bonds.* (See Ex. 7, page 85.)

The face, F, of an annuity bond is its present value. Annuity payments (redemptions plus dividends) are made at each dividend payment date, unless otherwise specified.

Example. An annuity bond for \$12,000 pays semiannual dividends at 5%. The issue matures at the end of 8 years. Find the price to yield the investor (.055, $m = 2$).

Solution. This contract provides the investor semiannual payments of \$919.188, as found from the equation

$$12{,}000 = R \cdot {}^{(2)}a_{\overline{8}|.05}^{(2)}.$$

The value of these annuity payments to an investor who is to make $5\frac{1}{2}$%, compounded semiannually, on his investment is therefore

$$P = 919.188 \cdot a_{\overline{16}|.0275}.$$

The form of the complete solution in a single expression, better suited to logarithmic computation, would be

$$P = 12{,}000 \cdot a_{\overline{16}|.025}^{-1} \cdot a_{\overline{16}|.0275} = \$11{,}769.81.$$

EXERCISES

1. A company raises money for expansion by the issue of $30,000, 10-year annuity bonds, which bear interest at (.04, $m = 2$). Find the price of the complete issue to yield the investor (.05, $m = 2$). *Ans.* $28,601.46.

2. A land development company is selling small homes at $4,500, to be paid for by monthly payments over a period of 12 years. If monthly payments include interest at 4%, compounded monthly, what may an investment company pay for these contracts if it desires (.06, $m = 12$) on its investment?

3. Solve Ex. 2 if the investor is satisfied with 5% effective on his investment. *Ans.* $4,285.603.

4. A 10-year annuity bond for $10,000, with dividends at 5%, payable semiannually, is sold 6 years before maturity for $6,250. Determine to four decimal places the interest rate (j, $m = 2$) made on this investment.

5. A sells his property for $20,000 and accepts in payment a cash sum of $7,500 and a first mortgage, bearing interest at 7%, for the unpaid balance. The mortgage, principal and interest, is to be paid by equal annual payments over a period of 15 years. Immediately after the mortgage payment which reduces the principal to less than $10,000, a bank takes over the contract at a price which allows it to make 8% on the investment. What does the bank pay for the mortgage contract?
Ans. $9,209.13, ten years before maturity.

6. To finance the erection of a school building, a county issues $75,000 annuity bonds, paying interest at 5% per year. The debt is to be liquidated over a period of 15 years. One third of the issue is sold at a price to yield 4% and to mature at 15 years, one third is sold to yield 5% and to mature in 10 years, and one third is sold to yield 6% and to mature at 5 years. Find the cash proceeds realized from the sale of these bonds.

DEPRECIATION

54. Definitions and terminology. In the conduct of business enterprise it is often necessary to make large investments in plant and equipment. For a business in continuous operation much of the equipment must be frequently renewed, and even the buildings must be replaced in time. Current repairs of both building and equipment are necessary for efficiency of operation. The *loss in value not provided for by current repairs* is known as *depreciation.*

Every competent business organization recognizes and provides for loss by depreciation. Certain enterprises, such as the railroads, use more or less elaborate methods specifically adapted to their individual needs. Especially in smaller organizations nonsystematic methods are often in operation. Among the systematic methods for handling depreciation which are adapted to mathematical treatment, we shall discuss more or less in detail the following:

1. Straight-line method.
2. Constant-percentage method.
3. Sinking-fund method.
4. Compound-interest method.
5. Unit-cost method.

In addition, the application of depreciation methods to two special problems will be presented in (1) the evaluation of mining property and (2) the economic increase in service life by additional investment.

It will facilitate the presentation to introduce here symbols for terms which are common to each of these topics. Let

C = *original cost* of asset.
S = *salvage value* at end of useful life.
R = *annual replacement charge*, a sum set aside each year to provide for depreciation.
D_t = *total* sum for *depreciation at end of t years*; its value at end of nth year (estimated life) is $D = C - S$, the total replacement charge.
$D_t - D_{t-1}$ = *annual depreciation charge* for tth year.
B.V. = *book value* of an asset on a given date, equal to original cost less the accumulated depreciation.
W_t = wearing value at end of t years, equal to $D_n - D_t$, which from the definitions above may evidently be expressed also as B.V. $- S$.

55. Straight-line method. The simplicity of the straight-line method of providing for depreciation is probably the one feature which recommends it. The method consists in merely writing off each year one nth of the total replacement charge. The annual replacement charge is therefore very simply expressed as

$$R = \frac{C - S}{n}.$$

In the bookkeeping of the company, computations are readily made, since there are no interest calculations involved. For instance, an asset which cost \$1,500 when new, and which is estimated to have a salvage value of \$300 at the end of 6 years, would be charged with a \$200 depreciation each year during the 6 years. At the end of 2 years, say, the following entries would be made:

$$D_2 = 2 \times 200 = \$400.$$
$$\text{B.V.} = \$1{,}500 - 400 = \$1{,}100.$$
$$W_2 = \$1{,}100 - 300 = \$800.$$

56. Constant-percentage method. As its name implies, this method assumes that the rate at which an asset depreciates each year is constant. If a plant valued at \$35,000 depreciates 4% each year, the depreciation charge the first year will be 4% of \$35,000, or \$1,400; hence the book value at the beginning of the second year will be \$33,600. Similarly, during the second year a depreciation of 4% of this value is \$1,344, and the third year begins with a plant valuation of \$32,256, etc. In general, if r be the effective rate of depreciation which reduces the value of an asset from C to S in n years, then we have (see formula [19], page 30)

$$C(1 - r)^n = S, \tag{62}$$

from which it readily follows that

$$r = 1 - \sqrt[n]{\frac{S}{C}}, \tag{63}$$

and the book value of the asset at the end of t years, $t \leq n$, which is $C(1 - r)^t$, readily reduces to the form

$$\text{B.V.} = C\sqrt[n]{\left(\frac{S}{C}\right)^t}. \tag{64}$$

EXERCISES

1. It is estimated that a machine costing \$4,000 must be replaced at the end of 5 years. Determine the constant rate of depreciation if the machine has a salvage value of \$800 at the time of replacement. *Ans.* .2752.

2. Using the form shown below, make proper entries for the depreciation of the asset of Ex. 1, for the years from 1 to 5, by (*a*) the constant-percentage method; (*b*) the straight-line method.

Age in Years (1)	B.V. at End of Year (2)	Depreciation Charge (3)	Total Depreciation (4)
0	$4000		
1			

3. In Ex. 2, using the data of column (1) as abscissas, and those of columns (2) and (4) as ordinates, present two graphs for the data of part (*a*). Do the same for the data of part (*b*).

4. Discuss formulas [62] to [64] for the case in which the salvage value, s, is zero.

5. A business structure costs $18,500 to build and has an estimated life of 20 years, with a salvage value at that time of $2,500.

a. Determine the rate of depreciation by the constant-percentage method.

b. Determine the depreciation charge for the fourth year by both the constant-percentage method and the straight-line method.

Ans. a, .09523. *b*, $1,304.85; $800.

6. The proprietor of an $80,000 establishment decides to use 5% as a rate for calculating depreciation.

a. Find the book values at the ends of 5, 10, and 20 years respectively.

b. At the end of what year will the book value first be less than $10,000?

57. Sinking-fund method. Probably one of the most widely used methods of providing for depreciation is that of the sinking fund. Economic considerations often make it profitable for an organization to reinvest in its own business the funds thus provided. Other aspects of the problem also tend to reduce it largely to one of bookkeeping. The present mathematical treatment, however, does not concern itself with that part of the problem.

Assuming that a fund can be accumulated at a rate j, compounded m times a year, we wish to determine the annual replacement charge, R, which will provide $C - S$ dollars at the end of n years. This is the familiar problem of setting up an ordinary annuity equation. Almost invariably the values of m and p are each equal to one, and hence we write for this case

$$[65] \qquad R = (C - S) \cdot s_{\overline{n}|i}^{-1}.$$

Example 1. A machine is purchased for $8,000. It can be expected to last 6 years and have a trade-in value at that time of $1,000. If a sinking fund can be accumulated at 5%, find (*a*) the annual replacement charge, (*b*) the book value of the machine at the end of the 3d year, (*c*) the wearing value at the end of the 3d year, and (*d*) the annual depreciation charge at the end of the 4th year.

Solution. (*a*) $R = \$7{,}000 \cdot s^{-1}_{\overline{6}|.05} = \$1{,}029.12$

(*b*) $\text{B.V.} = \$8{,}000 - 1{,}029.12 \times s_{\overline{3}|.05} = \$8{,}000 - 3{,}244.30 = \$4{,}755.70$

(*c*) $W = \$4{,}755.70 - 1{,}000 = \$3{,}755.70$

(*d*) The *annual depreciation charge* for the fourth year may be calculated by the relation $D_4 - D_3$ or, since the fund is increased each year by R plus the interest from the fund for that year, it can be evaluated as

$$\$1{,}029.12 + .05 \times \$3{,}244.30 = \$1{,}191.34.$$

In case the plant consists of several parts with, in general, a different estimated life for each part, the *composite life* is defined as the number of years, n, found from the equation

$$R \cdot s_{\overline{n}|i} = R_1 \cdot s_{\overline{n_1}|} + R_2 \cdot s_{\overline{n_2}|i} + \cdots R_k \cdot s_{\overline{n_k}|i},$$

where $R_1, R_2, \cdots, R_k$ and $n_1, n_2, \cdots, n_k$ denote, respectively, the replacement charge and the estimated life of parts $1, 2, \cdots, k$, and where $R = R_1 + R_2 + \cdots R_k$. The amount in the sinking fund at a given time, assuming that each part is replaced at the end of its estimated life, would evidently be the sum of the accumulated replacement charges for the respective operating units.

Example 2. The following information concerning a certain organization is given:

Part	Cost	Estimated Life	Scrap Value
A	$40,000	20 years	$10,000
B	25,000	12 years	5,000
C	9,000	5 years	1,000

Assuming that a sinking fund can be accumulated at 4%, find (*a*) the composite life of the plant, and (*b*) the amount in the sinking fund at the beginning of the 16th year.

Solution. The values of R_1, R_2, and R_3 are readily found to be, respectively, \$1,007.45, \$1,331.04, and \$1,477.02, and hence their sum $R = \$3{,}815.51$. From this we have

(*a*) $$\$3{,}815.51 \cdot s_{\overline{n}|.04} = \$58{,}000.$$
$$\therefore n = 12.+$$

(*b*) Since unit **B** of the plant has just been replaced once, 3 years previously, and unit **C** has just been replaced for the third time, the amount in the sinking fund, abbreviated S.F., is

$$\text{S.F.} = \$1{,}007.45 \cdot s_{\overline{15}|.04} + \$1{,}331.04 \cdot s_{\overline{3}|.04} + 0 = \$24{,}327.74.$$

EXERCISES

1. A school board is required to set aside annually, in a sinking fund paying 4%, a sum sufficient to replace a $30,000 building at the end of 25 years. It is assumed that the old building will have a salvage value of $3,500 and that a new one can be built for the original price.

a. What annual deposits must be made into the depreciation fund?

b. Find the book value of the building at the end of 15 years.

Ans. a, $636.32; *b,* $17,258.65.

2. Prove that the annual depreciation charge for the *t*th year, by the sinking-fund method of depreciation, is equal to $R(1 + i)^{t-1}$.

3. A machine has an original value of $17,500. Its depreciation is to be covered by annual deposits in a sinking fund paying 6% annually, under the assumption that the value of the machine at the end of 8 years will be $2,500.

a. Find the annual replacement charge.

b. What is the *ratio* of the *wearing value* of the machine *at the end of 4 years* to the *original cost of the machine?* (This ratio is known as the *condition per cent* of the machine.)

Ans. a, $1,515.54; *b,* .4783.

4. From the data of Ex. 3 complete the following depreciation schedule:

Year (1)	Replacement Charge, R (2)	Interest on S.F. (3)	Depreciation Charge (2) + (3) (4)	Amount in S F. Σ (4) (5)	B.V. at End of Year, $C-(5)$ (6)
0					$17,500.00
1	$1,515.54	$0	$1,515.54	$1,515.54	15,984.46
2	1,515.54	90.93	1,606.47	3,122.01	14,377.99
3	1,515.54	187.32	. . .	. . .	. . .

5. A company establishes a sinking fund to provide for the depreciation on a plant for which the following are given:

Part	Cost, New	Probable Life	Salvage Value
Building	$100,000	40	$8,000
Machinery	300,000	20	25,000
Fixtures	25,000	10	500

Assuming that a sinking fund earns 4%, find (*a*) the total annual replacement charge and (*b*) the amount in the sinking fund just after 30 years have elapsed; after 35 years; after 40 years. *Ans.* (*a*) $12,243.77. (*b*) $165,175.42; $267,277.38; 00.

6. A plant consists of three parts: (1) building—cost when new, $70,000; salvage value estimated at $3,000 at end of 40 years; (2) machinery—cost when new, $123,000; estimated salvage value at 15 years, $7,000; (3) power plant—cost when new, $47,000; salvage value 30 years hence estimated at $6,000. A sinking fund can be accumulated at $4\frac{1}{2}\%$.

a. Find the annual replacement charge.

b. Find the composite life of the plant.

c. What will be the wearing value of the machinery at the end of the eighth year?

7. A newly organized company erects a plant which costs $40,000. It is decided to set up a sinking fund which, together with an estimated salvage value of $5,000, will provide for rebuilding at the original cost 30 years hence. If monthly sinking-fund deposits are credited at (.04, $m = 4$), (*a*) find the wearing value of the plant at the end of 15 years. (*b*) What sum, including that in the sinking fund, would be necessary to renovate completely and to enlarge the plant at the end of 20 years so that the new plant valuation would be $65,000? *Ans.* $\frac{R}{12} = \$50.548$: (*a*) $22,574.09, (*b*) $43,512.12.

58. Compound-interest method. If the sinking-fund contribution (see Ex. 2, page 120), together with the profit from investment (a per cent of the book value), is reinvested each year in the business, then the total sum available for reinvestment at the end of any given year is readily computed. For instance, from the table of Ex. 4 on page 120, assuming that the organization operating the machine is realizing 12% on its business, there would be at the end of the second year

$$\$1{,}606.47 + .12 \times 15{,}984.46, \quad \text{or} \quad \$3{,}524.61,$$

available for reinvestment. This method of *making its own business the recipient of the sinking-fund payments* is sometimes called the *compound-interest method of depreciation.* In general, a business realizing a rate r on its investment would have *for reinvestment at the end of t years* the sum

$$R(1+i)^{t-1} + (C - R \cdot s_{\overline{t-1}|}) \cdot r. \qquad [66]$$

EXERCISES

1. Using the data of Ex. 3, page 120, find the amount available for reinvestment at the end of the fifth year, assuming that the company is realizing 12% on its investment. *Ans.* $3,217.74.

2. *a.* Show that the general expression for the amount available for reinvestment at the end of t years can be written in the form

$$C \cdot r - \frac{R}{i} \cdot (1+i)^{t-1} \cdot (i - r) + \frac{R \cdot r}{i}.$$

b. In particular, show that if the rate realized on investment is the same as that maintained by the sinking fund, the amount available from year to year is a constant, $R + C \cdot i$.

3. A company uses an interest rate of 3% on depreciation allowances (i.e., sinking-fund rate), and makes an average return of 10% on its investment. A machine costing $750 has an estimated salvage value of $75 at the end of 5 years. Check the values shown in the table below and complete the table.

Age in Years t	B.V. of Machine at End of Year	Depreciation Allowance $R \cdot (1+i)^{t-1}$	Return on Investment B.V. × 10%	For Reinvestment
0	$750			
1	622.861	$127.139	$75	$202.139
2	491.908	130.953	. . .	. . .
3	357.026	. . .	. . .	. . .

4. A business is operating a plant valued at $100,000. A depreciation fund is shown on its books as operating on a $3\frac{1}{2}\%$ basis. The business averages 15% on its investment. Assuming a salvage value at the end of 30 years of 10% of the present valuation, set up the last three lines of the schedule, using the form shown in Ex. 3.

59. Unit-cost method. Obviously, many things must be considered by an organization in choosing a method to care for its depreciation losses. The reader could name important aspects of depreciation not provided for by any of the methods thus far discussed: obsoleteness of machinery created by various causes; varying costs in operation; and character and amount of output of a given unit are among those which are most obvious. Regarding a machine, for instance, a seemingly logical statement to make would be that an old machine should be replaced whenever the unit cost of its output may be substantially reduced by replacement. The problem thus becomes one of finding a feasible method of evaluating the old machine in terms of the one by which it may be equitably replaced.

Let us consider, then, the unit cost per year (for simplicity) of two machines which we shall designate as the new machine and the old machine, respectively, using capital letters for quantities relating to the new machine and small letters for quantities relating to the old machine. If, then, we allocate the total cost of the new machine's output of U units as (*a*) interest on investment, $C \cdot i$, (*b*) annual operating expense, O, (*c*) yearly amount for depreciation of C in a given time, $C \cdot s_{\overline{n}|i}^{-1}$, and (*d*) yearly amount necessary to care for machine repairs, R, the unit costs of the new machine and of the old machine are said to be equal when

$$\frac{Ci + C \cdot s_{\overline{N}|i}^{-1} + R + O}{U} = \frac{ci + c \cdot s_{\overline{n}|i}^{-1} + r + o}{u},$$

where small n denotes the *remaining* service life of the old machine.

Remembering that $a_{\overline{n}|i}^{-1} = i + s_{\overline{n}|i}^{-1}$, the above equation may be solved for c and expressed in the following convenient form:

$$c = u \cdot a_{\overline{n}|i}\left[\frac{C \cdot a_{\overline{N}|i}^{-1} + R + O}{U} - \frac{r+o}{u}\right]. \tag{67}$$

EXERCISES

1. A company is considering the purchase of a new machine just placed on the market. It is priced at $3,600, will produce 80 units per year, and has an estimated life of 8 years. The machine will cost $400 a year to operate, and repairs are estimated at $200 annually. In the light of this offer, with money worth 5%, what is the value to the company of the old machine, which has a remaining service life of 5 years, turns out 60 units annually, and costs $300 and $240, respectively, for operating and repairs? *Ans.* $1,418.98.

2. If a new machine described in Ex. 1 failed to produce more than 60 units annually, would the new machine still be more valuable to the company, and, if so, by how much?

3. Reduce formula [67] to its simplest algebraic form for the case in which $U = u$.

4. Simplify formula [67] as much as possible on the assumption that operating costs, repairs, and output are the same for both the old and the new machine.
(This formula will be referred to again later in this chapter.)

5. A manufacturer wishes to design a new machine, estimated to last 5 years, which will sell for $1,000, will cost $150 annually to operate, and will have annual repairs limited to $100. If this is to replace a machine producing 300 units per year (approximately one each working day), costing annually $300 for operating and repairs, and having to be replaced approximately every 3 years, how many units must the new machine produce annually to make the old machine valueless? Assume money to be worth 4%. *Ans.* 475.

6. Other factors being equal, by what amount, x, is the maker of a machine of double the output capacity justified in increasing the price if it is to be equally valuable to the purchaser?

7. Using the formula developed in Ex. 6, determine the price to be set on a machine which will have double the output but which will have estimated costs the same as for a machine now selling for $5,000, with an estimated life of 6 years, costing $300 annually to operate, and with annual repairs amounting to only $70. Money is currently worth 4%. *Ans.* $11,939.59.

60. Depreciation of mining property and other income investments. It has often been found feasible to discuss the general problem of *periodic income,* which will provide both for a *fixed income on investment* and for *losses by depreciation,* under the general title of depreciation or evaluation of *mining property.* However, as will be quite obvious from the discussion, the method to be presented is *adapted* to a wide range of problems pertaining not only to assets which depreciate but *also to assets which appreciate,* such as bonds, for instance.

There are essentially no new principles involved in the solution of this problem. If depreciation losses are to be provided for by a sinking fund, the problem merely specifies that, in general, any income (often referred to as dividends) must always be divided into two parts, one part to be set aside to provide for depreciation, and the remainder to be regarded as yield on investment. This basic statement may be expressed formally as

[68] **Income = (Interest on investment) + (S.F. payment).**

If, as in the case of bonds, the salvage value (redemption price in this case) is greater than the price paid, then the sinking-fund payment is an addition to income, that is, a negative quantity when retained in the right member of equation [68].

Although the verbal statement [68] is quite sufficient, and probably the most easily applied in the analysis of the problems to be considered, the statement is readily put into symbolic form. If an investment of P with a salvage value S at the end of n years yields a periodic income of D dollars p times per year, then that part which may be set aside for depreciation, if invested at (j_2, m_2), is the value $\frac{R}{p}$ found from the relation $R \cdot {}^{(m_2)}s_{\overline{n}|j_2}^{(p)} = (P - S)$. There is left, then, $D - \frac{R}{p}$, which the investor may consider as yield on the investment for that period, say $r \cdot P$. Hence, if the yield rate is expressed as (j_1, m_1), we have

[69] $$D = P \cdot r + \frac{R}{p},$$

where $r = \left(1 + \frac{j_1}{m_1}\right)^{m_1/p} - 1$. (See formula [14], page 19.)

Example 1. **A** buys a fleet of motor trucks at a cost of $1,600 each. At the end of 4 years the trade-in value is only $200 per truck. If the net monthly income from each truck is $60, what rate of interest, compounded quarterly, may **A** consider he is making on his investment, assuming that he can accumulate a sinking fund for the replacement of capital at the rate $(.04, m = 2)$?

Solution. The monthly payment to create a sinking fund of $1,400, $C - S$, in 4 years is

$$\frac{1{,}400}{12 \cdot {}^{(2)}s_{\overline{4}|.04}^{(12)}}.$$

Hence $$60 = 1{,}600 \cdot \frac{j}{12} + \frac{1{,}400}{6 \cdot s_{\overline{8}|.02} \cdot s_{\overline{1}|.02}^{(6)}}$$

and $$\frac{j}{12} = .02065.$$

$$\therefore \left(1 + \frac{j}{4}\right)^4 = (1.02065)^{12}$$

and $$j = .2530,\ m = 4.$$

Example 2. The price of a \$1,000 bond, with semiannual dividends of \$20 each, to be redeemed 5 years hence at 105, so as to yield the investor 5%, convertible semiannually, is given by the expression $P = 1050(1.025)^{-10} + 20 \cdot a_{\overline{10}|.025}$ (see formula [54], page 98). Reduce this expression to the form of formula [69].

Solution. As stated, this is a purely algebraic problem. Given

$$P = 1050(1.025)^{-10} + 20 \cdot a_{\overline{10}|.025}.$$

$$\therefore 20 = \frac{P}{a_{\overline{10}|.025}} - \frac{1050}{a_{\overline{10}|.025}(1.025)^{10}}$$

$$= \frac{P}{a_{\overline{10}|.025}} - \frac{1050}{s_{\overline{10}|.025}}$$

$$= \left(\frac{P}{a_{\overline{10}|.025}} - \frac{P}{s_{\overline{10}|.025}}\right) + \frac{P - 1050}{s_{\overline{10}|.025}};$$

or

$$20 = P \times .025 + \frac{P - 1050}{s_{\overline{10}|.025}},$$

which is the form desired. The final step in the algebraic simplification is obviously made possible by the relation $\frac{1}{a_{\overline{n}|i}} - \frac{1}{s_{\overline{n}|i}} = i$ (see formula [45], page 68).

EXERCISES

1. It is estimated that a tract of timber land will yield a semiannual income of \$9,000 for a period of 30 years, at the end of which time the bare land will bring \$5,000. If a sinking fund for replacement of capital can be accumulated at $(.04, m = 1)$, what is the maximum price which a purchaser can afford to pay for the property if he desires $(.06, m = 2)$ on his investment? *Ans.* \$234,922.20.

2. A mine can be made to produce a net annual income of \$50,000 for 25 years. At the end of that time the land, machinery, tools, etc. will probably bring \$20,000. On this basis, what effective rate of interest will it yield the purchaser if he pays \$420,000 for the property and if a sinking fund for replacement of capital can be accumulated at $(.05, m = 2)$?

3. *a.* Solve formula [69] for P under the assumption that $S = 0$ and $m_1 = m_2 = p = 1$.

b. Show that when the yield rate, j, is equal to the sinking-fund rate, i, then the result found in *a* may be written in the form $P = R \cdot a_{\overline{n}|i}$.

c. Does the result in *b* admit of a ready verbal interpretation? If so, give it.

4. Show that the general formula 54, page 98, for finding the price of a bond, i.e., $P = Fg \cdot {}^{(m_2)}a_{\overline{n}|j}^{(m_1)} + C\left(1 + \frac{j}{m_2}\right)^{-m_2 n}$, may be reduced to the form $\frac{Fg}{m_1} = P \cdot r + \frac{P - C}{\frac{m_1}{m_2} \cdot s_{\overline{m_2 n}|j/m_2}^{(m_1/m_2)}}$, where $r = \left(1 + \frac{j}{m_2}\right)^{\frac{m_2}{m_1}} - 1$. State this result verbally.

5. A corporation is to place a \$30,000 bond issue on the market at a price of \$25,000. If the bonds are to be redeemed in 15 years at 105, what quarterly coupons must be attached in order to allow the investor to make (.06, $m = 2$) on his investment? *Ans.* \$304.42.

6. An investor in oil property desires 10% on his investment and assumes that he can accumulate a sinking fund at 5%. Under these conditions, what is the maximum price he can afford to pay for an oil field if the net annual revenue for its 10 years of life is estimated at \$100,000 and it is valueless thereafter?

7. Solve Ex. 6 if the investor is satisfied with 5% on his investment. *Ans.* \$772,173.49.

8. A 99-year lease of a hydroelectric plant is offered for sale. It is estimated that sales of electricity from this plant will yield a net annual income of \$20,000. How much can a group of investors afford to pay for this lease if they demand a 10% return on their investment and if they desire to accumulate a sinking fund which will allow 4% effective on annual deposits to the fund?

9. A syndicate pays 12 million dollars for a mining property which it will operate for 40 years, after which time the property will revert to its original owners with an allowance of \$50,000. If a sinking fund can be accumulated at 5%, what net annual income must the mine produce in order that the syndicate realize 12%, converted semiannually? Give the answer to the nearest dollar. *Ans.* \$1,970,924.

10. The quarterly income from a ship for which a transportation company paid \$25,000 is \$1,250, net. If the company maintains a depreciation fund at (.04, $m = 2$), how much must it realize on the sale of the ship to a salvage company at the end of 10 years in order to realize 13%, compounded semiannually, on its investment?

61. Economic increase in service life by additional investment. The businessman is often confronted with the problem of replacing an old article by a new one, or of investing money in parts and repairs to extend the service life of an asset, or of exchanging a good machine for one of more recent design. These are, however, all simply different ways of stating one fundamental problem, namely, *the determination of the value of one asset so that it shall be economically equivalent to the value of a second asset.*

Just as there are several methods of stating the problem, there are several methods of setting up the solution. A more or less evident formulation of the problem is to say that two assets are equally economical if the capitalized cost of the first is equal to the capitalized cost of the second, say $C_1C_1 = C_2C_2$. Having assumed that replacement is necessary for continuous operation, this relation merely gives a mathematical expression for the condition that the monetary value of all future replacements be the same for whatever asset is chosen. Any asset of value C_1 such that $C_1C_1 < C_2C_2$ would, of course, be even more economical.

A term sometimes met with in this type of problem is the *annual investment charge,* which is merely the periodic interest necessary to maintain a sum equivalent to the capitalized cost of the asset in question. If interest is computed at (j, m), the two assets would be equally economical, then, if $\frac{\dot{j}}{m} \cdot C_1C_1 = \frac{\dot{j}}{m} \cdot C_2C_2$, under the same assumptions stated above.

Example. How much can the owner of an article which costs \$100 and has a salvage value of \$10 at the end of 2 years afford to pay for a better article for the same purpose if the new one will last for 3 years and have a salvage value at that time of \$25? Assume that money is worth 4%, compounded quarterly.

Solution. Let x denote the value of the new article under consideration. Equating the capitalized costs and solving for x, we have

$$x + \frac{x-25}{3} \cdot {}^{(4)}a^{(\frac{1}{3})}_{\overline{\infty}|.04} = 100 + \tfrac{90}{2} \cdot {}^{(4)}a^{(\frac{1}{2})}_{\overline{\infty}|.04}.$$

$$x + (x-25) \cdot \frac{1}{.01} \cdot s^{-1}_{\overline{12}|.01} = 100 + 90 \cdot \frac{1}{.01} \cdot s^{-1}_{\overline{8}|.01}.$$

$$x(.01 + s^{-1}_{\overline{12}|.01}) = 1 + 90 \cdot s^{-1}_{\overline{8}|.01} + 25 \cdot s^{-1}_{\overline{12}|.01}.$$

$$x = 13.833347 \cdot a_{\overline{12}|.01}$$

$$= \$155.70.$$

From the above solution it is readily obvious that if, in the second equation, we multiply through by .01, giving

$$x(.01) + \frac{x-25}{s_{\overline{12}|.01}} = 100 \times .01 + \frac{90}{s_{\overline{8}|.01}},$$

we have on each side of the equality sign the exact form given by formula [69]. The interpretation is fairly obvious; for we could as well have obtained the solution of the problem with the interpretation that to be equally economical the income from the two assets must be equal, both the rate on the investment and the sinking-fund rate being determined by the current value of money. The annuity notation, when thus simplified, expresses the service life (depreciation period) of the two assets in terms of interest periods.

EXERCISES

1. A truck-owner has been paying \$25 for tires which last 6 months and have a trade-in value of \$5. How much can he afford to pay for tires, to be equally economical, which will last twice as long and have the same trade-in value, if money is worth 6% effective? *Ans.* \$44.43.

2. A pays \$65 for his suits, wears them, on the average, one year, and sells them to the "old-clothes man" for \$2. He decides to have new suits oftener and pay less for them. To be equally economical, how much can he afford to pay for suits lasting 6 months and having no resale value, if money is worth 5%?

3. A garden hose costs $10 and will last 3 years. If money is worth 4% effective, how much can one afford to pay for a better grade of hose that will last for 5 years? *Ans.* $16.04.

4. *a.* Show that, if x denotes the price of the better hose in Ex. 3, the solution may be expressed in the form

$$x = 10 \times a^{-1}_{\overline{3}|.04} \times a_{\overline{5}|.04}.$$

b. Show that, in general, when the salvage value of the two assets $S_1 = S_2 = 0$, with n_1 and n_2 each integral and equal to $\frac{m}{p_1}$ and $\frac{m}{p_2}$, respectively, the cost C_2 of the asset to replace economically the asset which cost C_1 is given by the expression

$$C_2 = C_1 \cdot a^{-1}_{\overline{n_1}|j/m} \cdot a_{\overline{n_2}|j/m}.$$

Compare this formula with the result found in Ex. 4, page 123.

5. Posts cost $8 and will last 5 years. How much could be profitably spent to treat them with creosote if the treatment increases the life by 4 years? Money is worth 4%. *Ans.* $5.36.

6. A taxicab company pays $800 for a car that will last 2 years and have a salvage value of $100 at that time. To be equally economical, how long, at the least, must a taxicab last for which the company pays $1,600 if the salvage value is $200 and if upkeep and operation are $10 per month more than on the $800 cab? Assume money worth (.04, $m = 2$).

7. A piece of machinery costing $250 will last for 2 months and have a scrap value of $50. If money is worth (.04, $m = 2$), what additional amount could one afford to spend to replace this machine by one which would last 3 months and have a scrap value equal to 20% of its original value? *Ans.* $124.08.

8. It is necessary to dredge a certain river every 15 years at a cost of $100,000. If the river is straightened and dredged deeper, the current will keep the bed clear so that dredging will be necessary only every 60 years. On a 6% basis, how much more can profitably be spent for the more thorough operation if the next dredging is done immediately?

CHAPTER VIII

APPROXIMATIONS AND LIMITS IN FINANCIAL PROBLEMS

62. Introduction. Thus far we have used only those approximate methods which are of very common occurrence and where, for the most part, the extent of the approximation is easily comprehended both from experience and from the mathematics involved in obtaining the approximation. One example is the use of simple interest as an approximation for compound interest when a fractional conversion period is involved. The evaluation of, perpetuities assumes only such knowledge of limits as one encounters in summing an infinite geometric sequence in elementary algebra. The validity of many other approximations and the determination of limiting values, frequently met with in other financial problems, are based, at least in part, on more advanced mathematical methods. By deferring to this point a consideration of problems involving such methods, the student with less mathematical preparation is less likely to fail to master thoroughly the *exact* method of solution on account of the immediate availability of a more easily applied approximate method, the mathematics of which he may not understand. The solutions which we shall now consider thus become purely mathematical problems in the evaluation of very special cases; the general case, in each instance, is one with which the student should already be thoroughly familiar.

It is not the purpose of this discussion to develop the mathematical bases for all the methods to be used. Exact references will be given, in most cases, which the student may use, along with others familiar to him, for reviewing the desired topics.

63. Approximations and the binomial series. Many approximations are based on the binomial series. For convenient reference a formula for the binomial expansion is given here in the form

$$(a+b)^n = a^n + n \cdot a^{n-1} \cdot b + \frac{n \cdot (n-1)}{2!} \cdot a^{n-2} \cdot b^2 + \cdots$$
$$+ \frac{n(n-1)(n-2)\cdots(n-r+1)}{r!} a^{n-r} \cdot b^r + \cdots,$$

which is true for all values of n provided $a^2 > b^2$. With the aid of this form several approximations will be discussed.

A. Fractional interest periods. It is worth while to review, with some additional comments, the approximation made in using simple interest for compound interest when a fractional conversion period is involved. (See

Section 14.) Since n is fractional, we may write the accumulation factor in the form

$$[70] \quad (1+i)^{\frac{1}{t}} = 1+\frac{1}{t}\cdot i - \frac{(t-1)}{2!\,t^2}\cdot i^2 + \frac{(t-1)(2t-1)}{3!\,t^3}\cdot i^3 - \cdots, \quad -1 < i < 1$$

It can be shown that the error made in using only the first k terms of this series as its sum is numerically less than the first term omitted.* Thus the error in computing interest on $1,000 for one half an interest period, — i.e., $t = 2$, — the rate per period being 3%, is less than $\$1{,}000 \times \frac{2-1}{2\cdot 2^2}(.03)^2$, or 11¢.

EXERCISES

1. A government loan of $50,000,000 bearing interest at 6%, compounded annually, was paid 6 months after a regular interest-payment date.

a. What was the interest payment if simple interest was used for the fractional conversion period?

b. What was the interest payment if compound interest was used for the fractional interest period?

c. Compare the results of *a* and *b* with the third term obtained from the expansion of $50{,}000{,}000(1 + .06)^{\frac{1}{2}}$, thus checking the statement of the previous paragraph concerning the measure of error.

d. Determine the number of terms of the expansion of $(1 + .06)^{\frac{1}{2}}$ necessary to find, correct to the nearest cent, the amount of compound interest on the loan.
Ans. *a*, $1,500,000; *b*, $1,478,150.70; *c*, 3d term, – $22,500; *d*, 7.

2. Check the statement that the difference between the true interest and the approximate interest at 6 months, with the effective rate of interest at 6%, is 44 cents per $1,000.

3. With interest calculated at 6% effective, what is the largest principal that can be used in paying a debt at 6 months so that the amount at simple interest will be the same as the amount at compound interest? *Ans.* $11.44.

B. Fractional conversion periods in discount. In general, finding a usable mathematical expression for the measure of error due to the use of an approximation is often impossible. This is the case, for instance, if in formula [70] i is replaced by $-d$. The first two terms of this expansion give the expression for simple discount, an approximation used for compound discount for the period. All the terms of this series after the first are negative, and the above rule for measurement of the error does not apply. Some problems using this approximation will, however, indicate the extent of its validity.

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*Granville, Smith, and Longley, *Elements of the Differential and Integral Calculus* (*Revised Edition*), page 347. Ginn and Company. Love, *Differential and Integral Calculus*, Third Edition, page 274. Macmillan.

EXERCISES

1. In a large expansion program a financial group needs approximately \$50,000,000 for a period of 6 months, pending a bond issue. A contract for the repayment of the \$50,000,000 is signed, and the discounted value of this sum is turned over to the group.

a. What are the net proceeds of the loan if compound discount at the rate ($d = .06$, $m = 1$) is used in computing the discount?

b. What are the net proceeds if simple discount at 6% is used?

c. Determine the number of terms of the expansion of $(1 - .06)^{\frac{1}{2}}$ necessary to find correctly the amount of the compound discount on the loan.

Ans. a, \$48,476,798.58; *b*, \$48,500,000; *c*, 7.

2. Show that the difference between the amount of simple discount and the amount of compound discount, the effective discount rate being 6%, is 46 cents per \$1,000.

3. On the basis of an effective rate of discount of 6%, what is the largest amount for which the simple discount and the compound discount will be the same for a period of 6 months? *Ans.* \$10.78.

4. *a.* Evaluate the compound amount $A = 10,000,000(1 + .06)^{\frac{1}{2}}$ by the binomial expansion, using successively only 2 terms, only 3 terms, . . ., only 6 terms.

b. Similarly, evaluate the discounted amount $P = 10,000,000(1 - .06)^{\frac{1}{2}}$ and note the difference in the nature of the successive approximations as compared with the corresponding ones in part *a.*

C. Approximate equated time. Consider debts with maturity values D_1, D_2, $\cdots$, D_k, due in n_1, n_2, $\cdots$, n_k years respectively. If money is worth i per year, then the equated date (see Example 2, page 28) is found by solving for n the equation

$$(D_1+D_2+\cdots+D_k)(1+i)^{-n}=D_1(1+i)^{-n_1}+D_2(1+i)^{-n_2}+\cdots+D_k(1+i)^{-n_k}.$$

Expanding each of the several powers of $(1 + i)$ occurring in this equation, and using only the first two terms of each expansion as an approximation, we observe that, in effect, the resulting equation substitutes in each case simple discount at a rate i as an approximation for the present value at an interest rate i. The equation thus becomes

$$(D_1+D_2+\cdots+D_k)(1-ni)=\mathrm{D}_1(1-n_1i)+D_2(1-n_2i)+\cdots+D_k(1-n_ki),$$

from which

$$n=\frac{n_1D_1+n_2D_2+\cdots+n_kD_k}{D_1+D_2+\cdots+D_k}. \qquad [71]$$

The terms of the expansion of $(1 + i)^{-n}$, just as in [70], alternate in sign in case n is integral, and hence in such cases each of the approximations in the expression above will be in error by an amount less than the first term omitted; but whether the approximations on the right sufficiently compensate those made on the left is best answered here by comparing the exact results with the approximate results in the solution of several exercises.

When the time involved in each of the several durations is small, this method is used quite extensively in finding the average due date.

EXERCISES

1. Three debts to be paid are: \$3,000 due in 3 years without interest, \$4,000 due in 6 years with interest at $(.06, m = 2)$, and \$5,000 due without interest in 10 years. If money is worth 5%, compounded semiannually, find by the approximate method the time at which a single payment equal to the maturity value of the three debts will pay off the indebtedness. (See Example 2, page 28.) *Ans.* 6.80 years.

2. Find the equated time for the following noninterest-bearing debts when money is worth 6%: \$300 due in 90 days, \$500 due in 60 days, and \$1,200 due in 8 months. (See Ex. 3, page 29.)

3. Assuming money to be worth 4%, find the equated date for three bills, \$250, \$500, and \$750, due in 4 months, 8 months, and 12 months, respectively, using (*a*) the exact method and (*b*) the approximate method. *Ans.* (*a*) 280 days, (*b*) 280 days.

4. A debtor is granted the option of paying two debts — one of \$200, with simple interest at $4\frac{1}{2}\%$ for 60 days, and another of \$600, due a year hence with simple interest at 5% — by a single payment equal to the sum of the maturity values of the two debts. If money is worth 5%, when will the settlement be made if determined by (*a*) the exact method? (*b*) the approximate method?

D. Remarks on the approximate yield rate of a bond. The argument on which the expression for the approximate yield of a bond was set up (see Section 51) was not based solely on the use of simple interest as an approximation for compound interest. However, using the same method of procedure as that used in showing the relation between those two rates, the formula for the approximate yield rate of a bond, assuming n to be integral, $\dfrac{F\cdot g - \frac{1}{n}(P - C)}{\frac{1}{2}(P + C)}$, can be made to exhibit algebraically an explanation of why the results obtained by its use are very good first approximations.

Consider the case in which $m = p = 1$, the results of which are readily extended to the case in which $m = p \neq 1$. In the expression for $P = F + F(g - i)a_{\overline{n}|i} + E(1 + i)^{-n}$ let us replace $a_{\overline{n}|i}$ and $(1 + i)^{-n}$ by the corresponding series,

$$a_{\overline{n}|i} = n - \frac{n(n+1)}{2}\cdot i + \frac{n(n+1)(n+2)}{3!}\cdot i^2 - \cdots$$

and

$$(1+i)^{-n} = 1 - n\cdot i + \frac{n(n+1)}{2!}\cdot i^2 - \cdots.$$

If now we substitute in the above formula for the approximate yield rate the expression for P thus obtained by these replacements and collect like terms, we will find it possible to rewrite the fractional form thus obtained in the following convenient form:

$$\frac{F\cdot g-\frac{1}{n}(P-C)}{\frac{1}{2}(P+C)}=i\cdot\frac{F+F(g-i)(n+1)+E-\alpha}{F+F(g-i)(n+1)+E-\beta}, \tag{72}$$

where
$$\alpha=F(g-i)\left[\frac{(n+1)(n+2)}{3!}\cdot i-\frac{(n+1)(n+2)(n+3)}{4!}\cdot i^2+\cdots\right]$$
$$+E\cdot\left[\frac{n+1}{2}\cdot i-\frac{(n+1)(n+2)}{3!}\cdot i^2+\cdots\right],$$

and
$$\beta=F(g-i)\left[\frac{1+n(n+1)}{2}\cdot i-\frac{n(n+1)(n+2)}{3!}\cdot i^2+\cdots\right]$$
$$+E\left[n\cdot i-\frac{n(n+1)}{2}\cdot i^2+\cdots\right].$$

The rate thus determined, therefore, is i times a fraction which, in general, differs very little from unity. In the expressions for both α and β the fact that the coefficients of F and of E are both convergent alternating series makes it possible to give an upper limit to the error made in using only the first k terms, say, in their evaluation. From this it will be seen that when $g > i$ the numerator of the fractional form given by [72] will, in general, be less than the denominator, and hence the error in i will be an error in excess, and vice versa. An attempt to express the error of approximation more specifically is not very fruitful, but the added discussion of these two paragraphs does give some mathematical background for the validity of the formula under consideration.

EXERCISE

Find to four decimal places both the approximate and the exact yield rates of the bonds for which the following data are given, and thus determine the error in excess, or in defect, to four decimal places:

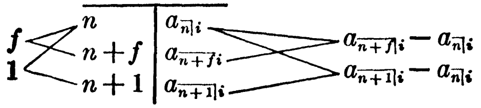
	F	C	P(B.V.)	Duration	g	m	Answer
a.	$10,000	$10,100	$12,250	10 years	.06	2	+ .0003
b.	1,000	970	995	7 years	.05	1	+ .0000
c.	10,000	9,800	10,200	5 years	.07	1	+ .0003
d.	5,000	5,300	5,000	6 years	.04	2	− .0002
e.	20,000	20,000	18,750	11 years	.05	2	− .0003
f.	10,000	9,800	9,500	6 years	.04	2	− .0001
g.	250,000	248,750	230,000	30 years	.045	1	− .0005

64. Partial annuity payment by interpolation. The general question of interpolation would in itself constitute a fairly lengthy study. An acquaintance with the calculus of finite differences * is necessary in order to discuss adequately the special interpolation method best suited to a particular type of problem.

The validity of straight-line interpolation has been sufficiently emphasized by the problems in the earlier part of the text to make the reader aware of the extent to which such interpolation can be used in the type of problems under consideration. The specific object of the discussion of this section is to direct attention to a much simpler method of solution of a problem presented earlier in the text; this method involves much less labor, and its validity is the direct result of ordinary interpolation.

In the exact determination of the final partial payment in problems of amortization (see Section 35, page 77) the number of regular payments was determined by solving for n an annuity equation of the form $P = R \cdot a_{\overline{n}|i}$, P, R, where i was known. In general there was no integral value of n satisfying this equation. A value of n determined by interpolation and expressed in the form $n + f$, say, where f is a fraction less than unity, leads to an interesting as well as valuable interpretation.

Consider the simplification resulting from the assumption that one may interpolate for intermediate values of n. From the usual tabulated form for making the interpolation,


f
1
n
$n+f$
$n+1$
$a_{\overline{n}|i}$
$a_{\overline{n+f}|i}$
$a_{\overline{n+1}|i}$
$a_{\overline{n+f}|i} - a_{\overline{n}|i}$
$a_{\overline{n+1}|i} - a_{\overline{n}|i}$

we have

$$\begin{aligned} f &= \frac{a_{\overline{n+f}|i} - a_{\overline{n}|i}}{a_{\overline{n+1}|i} - a_{\overline{n}|i}} \\ &= \frac{1-(1+i)^{-(n+f)} - 1 + (1+i)^{-n}}{1-(1+i)^{-(n+1)} - 1 + (1+i)^{-n}} \\ &= \frac{\cancel{(1+i)^{-n}}}{\cancel{(1+i)^{-n}}} \cdot \frac{1-(1+i)^{-f}}{1-(1+i)^{-1}} \\ &= (1+i) \cdot a_{\overline{f}|i}. \end{aligned}$$

Now let each member of this equation be multiplied by $R(1+i)^{-1}$, thus:

[73] $$f \cdot R(1+i)^{-1} = R \cdot a_{\overline{f}|i}.$$

This form immediately suggests itself as a definition of the annuity symbol $a_{\overline{f}|i}$. Adopting this definition and recalling formula [46], $a_{\overline{n_1+n_2}|i} = a_{\overline{n_1}|i} + a_{\overline{n_2}|i}(1+i)^{-n_1}$, we have, on replacing n_2 by f and writing n_1 simply as n,

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* Rietz and others, *Handbook of Mathematical Statistics*, chap. III, and Steffanson, *Interpolation*.

$$[74] \qquad R \cdot a_{\overline{n+f}|i} = R \cdot a_{\overline{n}|i} + f \cdot R(1+i)^{-(n+1)}.$$

But in amortization $R \cdot a_{\overline{n+f}|i}$ is the original value of the debt at the beginning of the period. Formula [74] says, then, that the present value of the debt is equal to the present value of n payments of R plus the present value of a fractional payment $f \cdot R$ made at the $(n+1)$th regular payment date. Therefore, having determined the value $n+f$ by interpolation, the *exact* final partial payment made on the next regular payment date is obtained directly by multiplying the fraction f by the regular payment R.

Example. A debt of \$20,000 bearing interest at $(.06, m = 2)$ is paid by making half-yearly payments of \$4,000 each. Determine the number of full payments and the amount of the final partial payment necessary to liquidate the debt. (See Example 1, page 78.)

Solution. First finding n from the annuity equation by interpolation, we have

$$4000 \cdot a_{\overline{2n}|.03} = 20{,}000.$$

$$a_{\overline{2n}|.03} = 5.$$

$$2n = 5 + \frac{42029281}{83748425} = 5.50185160.$$

From the above discussion the final partial payment on the 6th regular payment date is therefore

$$4000(.50185160) = \$2{,}007.406.$$

By the method of Section 35,

$$\begin{aligned} f \cdot R &= [20{,}000(1.03)^5 - 4000 \cdot a_{\overline{5}|.03}](1.03) \\ &= (2{,}318.548 - 2{,}123.654)(1.03) = \$2{,}007.406. \end{aligned}$$

EXERCISES

1. A debt of \$19,800 with interest at 5%, payable semiannually, is discharged by payments of \$2,700 at the end of each 6 months, as long as necessary, and a final partial payment at the next regular payment date which will exactly liquidate the debt.

a. Find the number of full payments.

b. Find the final partial payment by two methods.

Ans. a, $2n = 8.203809$; *b,* \$550.29.

2. Solve Exs. 1 (*a*), 1 (*b*), 3 (*a*), 4, and 9 on pages 78 and 79 by the method of this section and check with the solutions previously given.

3. A decides to accumulate a fund of \$10,000 by making annual deposits of \$1,000, followed by whatever partial payment is necessary at the last regular payment date. If the fund allows 3% annually, (*a*) determine the number of \$1,000 payments and the amount of the final partial payment. (*b*) Can the final partial payment be expressed as $f \cdot R$, where f is determined by interpolating between the $s_{\overline{n}|i}$ and $s_{\overline{n+1}|i}$ used in determining the number of full payments? Demonstrate your answer algebraically. *Ans.* (*a*) 9th pay't, \$840.89; (*b*) No.

65. Some logarithmic and exponential relations. In discussing the remaining topics of this chapter the following relations will be needed and are therefore stated here without proof.

$$\log_{10} x = \log_{10} e \cdot \log_e x = .4342945 \log_e x. \tag{75}$$

$$e = \lim_{x \to \infty} \left(1 + \frac{1}{x}\right)^x = 2.7182818. \tag{76}$$

$$e^x = 1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \frac{x^4}{4!} + \cdots. \tag{77}$$

$$\log_e (1 + x) = x - \frac{x^2}{2} + \frac{x^3}{3} - \frac{x^4}{4} + \frac{x^5}{5} - \cdots. \qquad (-1 < x < 1) \tag{78}$$

66. Time for P to accumulate to $k \cdot P$ at rate i. In order to determine the length of time necessary for P dollars invested at rate i to amount to k times the original investment, we must solve for n the equation

$$P(1 + i)^n = k \cdot P. \tag{79}$$

This equation may evidently be written in the form

$$n \log (1 + i) = \log k.$$

Making use of [75] and [78] above, this equation, when solved for n, takes the form

$$n = \frac{\log_{10} k}{.4342945\left(i - \frac{i^2}{2} + \frac{i^3}{3} - \frac{i^4}{4} + \cdots\right)},$$

or

$$n = \frac{2.302585 \log_{10} k}{i}\left(1 + \frac{i}{2} - \frac{i^2}{12} + \frac{i^3}{24} - \cdots\right). \tag{80}$$

The sum of a limited number of terms of the series from the right member of this equation may often be used to obtain an excellent approximation for n.

EXERCISES

1. Show that an approximation for the time necessary for money to double itself, if invested at rate i, is given by $n = \frac{.693}{i} + .35$.

2. Find the length of time for money to double itself, both by formula [79] and by the approximate expression of Ex. 1, (*a*) when the rate of interest is $3\frac{1}{2}\%$ and (*b*) when the rate of interest is 6%.

3. Calculate the error made in using the formula of Ex. 1 when the rate of interest is (*a*) $\frac{1}{2}\%$, (*b*) 1%, (*c*) 2%, (*d*) 7%, (*e*) 10%, (*f*) 15%. *Ans.* (*a*) .02 yr., (*b*) .01 yr., (*c*) .00 yr., (*d*) .01 yr., (*e*) .01 yr., (*f*) .01 yr.

67. Limiting values encountered in interest functions. From the nature of the mathematical problems met in finance the only values of m and p pertinent to their discussion are those which are positive. There are, however, in addition to the usual values, $\frac{1}{2}$, 1, 2, 4, 12, 365, etc., others which lead to interesting and valuable results. For instance, if $\left(1+\frac{j}{m}\right)^m$ is thought of as the rate of growth of an amount A, then, even though j remain constant, we know from experience with this factor that the value of A increases with m. Similarly, we know that the value of $R \cdot s_{\overline{n}|i}^{(p)} = R \cdot s_{\overline{n}|i} \cdot \frac{i}{p[(1+i)^{1/p}-1]}$ increases as p increases, the other elements of the formula remaining constant. (See tables.) From purely mathematical considerations one would like to know if these functions increase or decrease without limit as the values of m and p increase without limit. Interpreting these relations as laws of growth, one would like to know not only how these quantities grow under intermittent additions, i.e., m and p finite, but also the results of the growth as it takes place continuously, that is, as m or p increases without limit. A somewhat detailed consideration will answer these and other questions.

A. Value of interest functions when m *becomes infinite.* From the relation

$$\begin{aligned}(1+i) &= \left(1+\frac{j}{m}\right)^m \\ &= 1+j+\frac{1-\frac{1}{m}}{2!}\cdot j^2+\frac{\left(1-\frac{1}{m}\right)\left(1-\frac{2}{m}\right)}{3!}\cdot j^3+\cdots\end{aligned}$$

we have, on allowing m to become infinite,

$$1+i=1+j+\frac{j^2}{2!}+\frac{j^3}{3}+\cdots.$$

Identifying the expression on the right with form [77] above, we have

$$1+i=e^j.$$

As a convenience in notation when the nominal rate j is converted continuously, instead of writing the rate as (j, $m=\infty$) we write the j as δ, omitting the m altogether. Hence

$$\textbf{[81]} \qquad \mathbf{1+\mathit{i}=\mathit{e}^{\delta}.}$$

The value of δ corresponding to a given rate j is called the *force of interest.*

We may equally well obtain the same result with the aid of equation [76]. Phrased more nearly in the language of the introductory paragraph, we wish the value of $\left(1+\frac{j}{m}\right)^m$, as m becomes infinite, written symbolically $\lim_{m\to\infty}\left(1+\frac{j}{m}\right)^m$. Writing $\left(1+\frac{j}{m}\right)^m$ in the equivalent form $\left[\left(1+\frac{j}{m}\right)^{\frac{m}{i}}\right]^j$ and observing that as m becomes infinite $\frac{m}{j}$ also becomes infinite, j being finite, we have, from [76],

$$\left[\lim_{m\to\infty}\left(1+\frac{j}{m}\right)^{\frac{m}{j}}\right]^{j}=[e]^{j}.$$

Since for all values of m the effective rate i and the corresponding nominal rate j are connected by the relation $1+i=\left(1+\frac{j}{m}\right)^{m}$, we have as before, when m becomes infinite,

$$1+i=e^{\delta}.$$

The amount A to which P accumulates in n years at rate δ is

[82] $$A=P\cdot e^{n\delta}.$$

Force of discount, defined as the nominal rate of discount $(f, m=\alpha)$ corresponding to an effective rate d and denoted by δ', may be readily found from the relation $1-d=\left(1-\frac{f}{m}\right)^{m}$ by either of the methods used for finding δ. The relation between d and δ' is found to be

[83] $$1-d=e^{\ \delta'}.$$

The value of P to which A depreciates in n years at rate δ' is

[84] $$P=A\cdot e^{\ n\delta'}.$$

Example. A trust company agrees to allow interest at $\delta=.03$ on a legacy of \$15,000 to be held in trust for 20 years. What is the value of the legacy at the end of this time?

Solution. Substituting in [82] and taking logarithms of each side of the equation, we have

$$\begin{aligned}\log A &= \log 15{,}000+20(.03)\log_{10}e\\ &=4.1760913+.6(.4342945)\\ &=4.4366680.\\ \therefore A &= \$27{,}331.79.\end{aligned}$$

EXERCISES

1. Find the force of interest corresponding to (*a*) $i=.03$, (*b*) $(.03, m=2)$. *Ans.* (*a*) .0296, (*b*) .0298.

2. In the illustrative example above, by how much did the amount at 20 years exceed that which would have resulted from an investment rate of $(.03, m=2)$?

3. With the aid of formula [77] carry out the steps showing that $1-d=e^{-\delta'}$.

4. From the expression relating the effective rate of interest to the effective rate of discount, prove that $\delta=\delta'$.

5. The population of a certain city is 30,282. It has been growing steadily at a rate of 2%, i.e., $\delta=.02$. If this rate is maintained in the future, how long will it be before the population will be 50,000? *Ans.* 25.07 yrs.

6. A plant valued at \$50,000 is estimated to last 20 years. If depreciation is taking place continuously, find the rate of depreciation δ', determined by an estimated salvage value of \$15,000 at the end of the 20 years.

7. Recalling that $\log_e e = 1$, with the aid of equation [78] express (*a*) δ in terms of i, (*b*) δ' in terms of d. *Ans.* (*a*) $\delta = i - \frac{i^2}{2} + \frac{i^3}{3} - \cdots$, (*b*) $\delta' = d + \frac{d^2}{2} + \frac{d^3}{3} + \cdots$.

8. An investigation showed that out of 85,062 persons alive in a certain locality at age 40, there were 76,521 who survived to age 50. Assuming that deaths have been at a rate δ', find the death rate during the period.

B. Effect of increasing p indefinitely. By definition, p has to do with annuity payments. An annuity in which p is allowed to become *infinite* is called a *continuous annuity.* A formula for the evaluation of a continuous annuity follows readily from that of an ordinary annuity when p is allowed to increase without limit.

The general formula for either the amount or the present value of an annuity may be broken up into factors such that p is involved in only one of them, e.g., $R \cdot {}^{(m)}s^{(p)}_{\overline{n|}j} = R \cdot s_{\overline{mn|}j/m} \times \dfrac{j/m}{p\left[\left(1+\frac{j}{m}\right)^{\frac{m}{p}} - 1\right]}$. It is only necessary then to study the behavior of the factor $p\left[\left(1+\frac{j}{m}\right)^{\frac{m}{p}} - 1\right]$ as p becomes infinite.

Expanding $\left(1+\frac{j}{m}\right)^{\frac{m}{p}}$ by means of the binomial theorem, we have

$$p\left[\left(1+\frac{j}{m}\right)^{\frac{m}{p}} - 1\right] = p\left[\frac{1}{p}\cdot j + \frac{1}{p}\left(\frac{1}{p}-\frac{1}{m}\right)\cdot\frac{j^2}{2!} + \frac{1}{p}\left(\frac{1}{p}-\frac{1}{m}\right)\left(\frac{1}{p}-\frac{2}{m}\right)\cdot\frac{j^3}{3!} + \cdots\right]$$

$$= j + \left(\frac{1}{p}-\frac{1}{m}\right)\cdot\frac{j^2}{2!} + \left(\frac{1}{p}-\frac{1}{m}\right)\left(\frac{1}{p}-\frac{2}{m}\right)\cdot\frac{j^3}{3!} + \cdots.$$

$$\therefore \lim_{p\to\infty} p\left[\left(1+\frac{j}{m}\right)^{\frac{m}{p}} - 1\right] = m\left[\frac{j}{m} - \left(\frac{j}{m}\right)^2\cdot\frac{1}{2} + \left(\frac{j}{m}\right)^3\cdot\frac{1}{3} - \left(\frac{j}{m}\right)^4\cdot\frac{1}{4} + \cdots.\right.$$

Identifying the expression in the bracket on the right by formula [78], we may write

$$\begin{aligned}\lim_{p\to\infty} p\left[\left(1+\frac{j}{m}\right)^{\frac{m}{p}} - 1\right] &= m \log_e\left(1+\frac{j}{m}\right)\\ &= \log_e\left(1+\frac{j}{m}\right)^m\\ &= \log_e(1+i)\\ &= \delta.\end{aligned}$$

Using a bar over the annuity symbol to designate a continuous annuity, we have, therefore,

[85] $$R \cdot {}^{(m)}\bar{a}_{\overline{n}|j} = \frac{R \cdot a_{\overline{mn}|j/m} \cdot \dfrac{j}{m}}{\delta},$$

[86] $$R \cdot {}^{(m)}\bar{s}_{\overline{n}|j} = \frac{R \cdot s_{\overline{mn}|j/m} \cdot \dfrac{j}{m}}{\delta}.$$

Example. For each of its 200 employees a company credits 15 cents per day to a retirement fund. If interest is allowed at (.04, $m = 4$), determine the error in the amount at the end of the year when formula [86] is used as an approximation for finding the amount.

Solution. Making use of the binomial theorem to evaluate $365[(1.01)^{\frac{4}{365}} - 1]$ with sufficient accuracy, the exact solution is found to be

$$10{,}950 \cdot {}^{(4)}s^{(365)}_{\overline{1}|.04} = 10{,}950 \cdot s_{\overline{4}|.01} \frac{.01}{365[(1.01)^{\frac{4}{365}} - 1]} = \$11{,}170.22.$$

The approximate value by formula [86] is

$$10{,}950 \cdot {}^{(4)}\bar{s}_{\overline{1}|.04} = \frac{10{,}950 \times s_{\overline{4}|.01} \times .01}{2.3025585 \log_{10}(1.01)^4} = \$11{,}170.83.$$

EXERCISES

1. Find both (1) the exact value and (2) the approximate value, as determined by formula [86], for the amount at the end of 5 years of contributions of $1 per day if interest is credited at (*a*) 6% effective, (*b*) 6% compounded monthly. *Ans.* 1, (*a*) $2,118.50, (*b*) $2,118.66; 2, (*a*) $2,127.30, (*b*) $2,127.48.

2. Determine the formulas for $R \cdot {}^{(m)}\bar{a}_{\overline{n}|j}$ and $R \cdot {}^{(m)}\bar{s}_{\overline{n}|j}$. Does a verbal interpretation justify your results?

3. Weekly dues of 25 cents were deposited in a savings club for a period of 3 years. At the end of this time the depositor was allowed to withdraw a sum equal to $52 \times .25 \times \bar{s}_{\overline{3}|.02}$. Compare this with the amount which he would have received if calculated by $52 \times .25 \times s^{(52)}_{\overline{3}|.02}$. *Ans.* $401.82; $401.74.

4. A piece of unimproved property is valued at $3,000. Material improvements to the amount of $10 a day are made throughout the year. If the improvements cause the property, together with the improvements, to increase further in value at the rate of 20%, compounded quarterly, what will be the valuation of the property at the end of the year? Use formula [86] as an approximation in the annuity.

MISCELLANEOUS EXERCISES

1. Weekly savings by Christmas-club members in Ann Arbor totaled $285,000 at the end of 50 weeks, according to a report at Christmas time, 1940. No interest is allowed on these accounts. Assuming that it cost $100 each month to care for these accounts and that the banks had loaned half of these savings at 6% on short-term notes, averaging 6 months in duration, what was the net income realized from sponsoring these clubs? *Ans.* $3,075.

2. On June 10, **A** obtains from his employer a $100 check which is to be placed in the mail. On receipt of the check, **A** pays the employer $1 and asks that the amount of the check be deducted from his pay check at the end of the month. This loan cost **A** what rate if computed (*a*) at simple interest? (*b*) at (j, $m = 12$)? (*c*) at simple discount? (*d*) at (f, $m = 4$)?

3. **A** sells a piece of property, receiving one fourth of the price in cash and accepting a 3%, 10-year mortgage for the remainder. The price is set so that the holder of the mortgage can sell it at a discount of 10% of its face value and thus receive the desired price of $14,800 for the property.

a. Find the amount for which the mortgage is drawn.

b. What effective rate does the buyer of the mortgage make on his investment if the mortgage is amortized by equal annual payments over the 10 years?

c. If the principal of the mortgage was paid in a single sum at the end of the 10 years, the annual interest being paid as due, what interest rate would the purchaser be making?

Ans. a, $12,000; *b,* 4.26%; *c,* 5.12%.

4. **A** deposits $50 on March 1, 1942, and $50 each month thereafter until and including July 1, 1947. What amount does he have to his credit at that time if interest is added at (.03, $m = 2$), each January 1 and July 1, on all sums on deposit on the previous conversion date, and simple interest on all other deposits?

5. **A** sets aside $50 at the beginning of each month for 5 years in a fund which allows (.03, $m = 2$) on each deposit for the number of complete conversion periods it has been in the fund, and simple interest for the fractional interest periods involved during the last half of the fifth year. What is the value of the account at the end of the 5 years? *Ans.* $1,341.82.

6. A $10,000, 5½% bond is to be redeemed in 12 years at 110. By the use of Makeham's Formula (Ex. 6, page 100) find the price to yield the purchaser 5% effective.

7. A $10,000 bond issue, dated March 1, 1945, bearing semiannual dividends of $25 per thousand, is to be redeemed at par not later than March 1, 1960, and may be redeemed at any time after March 1, 1955. What can an investor afford to bid for such bonds in order to make at least (*a*) 5% on his investment? (*b*) 5½% on his investment? (*c*) 6% on his investment? *Ans.* (*a*) $10,817.57, (*b*) $10,000, (*c*) $9,019.78.

8. With the aid of the formula $P' = F \cdot \left(\frac{g-j}{m}\right) \cdot a_{\overline{mn}|j/m} + E \cdot \left(1 + \frac{j}{m}\right)^{-mn}$, discuss the following general problem suggested by Ex. 7 above. Bonds of face value F, bearing dividends at (g, m), are to be redeemed at c not later than n_2 years hence and may be redeemed at any time after n_1 years. What can an investor afford to bid for such bonds in order to make at least (j, m) on his investment, (*a*) where $j > g$? (*b*) where $j = g$? (*c*) where $j < g$?

9. Many mercantile establishments advertise their merchandise at a small down payment, the remainder to be paid by small periodic payments *with no carry-*

ing charge. Usually, however, a cash customer gets a cash discount. The Outfitting Company offers a vacuum cleaner priced at \$29.95 for \$2.95 cash, the remainder to be paid by weekly payments of 75 cents each, *with no carrying charge.* A cash customer buys the machine for \$26.95, i.e., at a 10% discount. Despite the "no carrying charge," what effective rate of interest is it actually costing the buyer who buys his machine by paying \$2.95 cash and \$.75 per week for 36 weeks? *Ans.* 8.03%.

10. To provide for the retirement of a \$110,000 bond issue 20 years hence, a newly organized company votes to set aside \$500 at the end of the first year and to increase these payments \$500 each year until the annual payment reaches \$5,000. Annual payments of \$5,000 are made thereafter until and including the twentieth year. What additional payment will be necessary on the last payment date in order to be able to retire the bond issue if the annual payments have been accumulated at 4%?

11. A student has \$4,000 which he places in a bank that allows interest at (.02, $m = 4$). What equal sums may he withdraw at the beginning of each of the 10 months during the school year, for each of the four years while in college, so that the fund will be exactly exhausted at the beginning of the last month spent in college? *Ans.* \$103.80.

12. An heir is left \$50,000 which is invested at (.05, $m = 2$). At the end of each year he may withdraw 12% of the sum shown to his credit until the investment has been reduced to \$5,000 or less, at which time he may withdraw the remainder. When and for what amount will the final withdrawal be made?

13. Bonds of face value \$10,000 pay dividends of \$200 on March 1 and on September 1. On April 1, 1933, an investor bought the entire issue for \$9,221.40. On February 1, 1941, the bonds were exchanged for another investment which allowed the investor \$9,774.85 for the bonds.

a. What was the investor's approximate yield rate?

b. If the bonds were to be redeemed on March 1, 1945, at 102, what was the approximate yield rate made by the second investor?

Ans. a, .050 −; *b*, .050 +.

14. For the past 12 years **A** has been adding \$500 twice a year to an investment. For the first 7 years all sums on deposit increased at the rate (.06, $m = 2$), and since that time they have increased at the rate (.04, $m = 4$). What effective rate of interest over the 12 years would have resulted in the same value for the investment?

15. A total of \$120,000 was paid into each of two funds, each of which allowed 5% annually. The payments made to fund **A** were in the form of a decreasing annuity, with \$15,000 at the first payment and the payments decreasing by \$1,000 each year, while fund **B** was accumulated by an initial payment of \$1,000, the payments increasing by \$1,000 each year. Compare the values of **A** and **B** at the end of the 15 years. *Ans.* **A**, \$153,149.83; **B**, \$192,107.18.

16. In the preceding problem the average annual payment in either case is \$8,000. If the payments in both the increasing and the decreasing annuity were replaced by equal annual payments which would yield the same sums as before at the end of the 15 years, by what amounts, respectively, would these annual payments differ from \$8,000?

17. Over a period of 7 years a medical student receives \$75 per month for 9 consecutive months out of each year, but nothing during the other 3 months.

a. What cash outlay, if invested at (.03, $m = 12$), would provide for these expenditures?

b. Show that the solution may be expressed as

$$V_0 = 75 \cdot a_{\overline{84}|\frac{1}{4}\%}[1 - s_{\overline{3}|\frac{1}{4}\%} \cdot s^{-1}_{\overline{12}|\frac{1}{4}\%}].$$

Ans. \$4,272.98.

18. Prove: (*a*) $$\mathrm{a}_{\overline{n}|i} = \frac{1 - v^n}{d}.$$

(*b*) $$v^n = V \cdot \mathrm{a}_{\overline{n}|i} - a_{\overline{n-1}|i}.$$

(*c*) $$d = \frac{1}{\mathrm{a}_{\overline{n}|i}} - \frac{1}{\$_{\overline{n}|i}}.$$

19. The present value of payments of \$250, made at the beginning of each month for 8 years, is \$18,443.86, and the sum of these payments at the end of the 8 years is \$32,236.66. Making use of the relation given in part (*c*) of Ex. 18, find (*a*) to what compound discount rate, *d*, these evaluations correspond. (*b*) From the value of *d* thus found, determine the corresponding value of the compound interest rate *i*. *Ans.* (*a*) .0674, (*b*) .0722.

20. In settling an estate, a debt of \$100,000, due 14 months hence, is to be discounted at (.04, $m = 4$). There are three plausible ways of making the evaluation: namely, (*a*) by finding the present value for the complete time at the interest rate as stated; (*b*) by discounting the \$100,000 for 15 months at the given interest rate and then accumulating this result for one month at simple interest (see approximate method, Section 14); and (*c*) by discounting the \$100,000 for 12 months at the given interest rate and then discounting this sum at a simple discount rate $d = .04$ for the other 2 months. Which of these sums is the largest and which one is the smallest? Give these two sums.

21. As a generalization of the preceding Ex. 20, determine the order of magnitude of P_i:

$$(a)\ P_1 = A(1 + i)^{-(n + p/q)}.$$

$$(b)\ P_2 = A(1 + i)^{-(n+1)} \cdot \left[1 + i\left(1 - \frac{p}{q}\right)\right].$$

$$(c)\ P_3 = A(1 + i)^{-n} \cdot \left[1 - i \cdot \frac{p}{q}\right].$$

22. Express i in terms of x and y, given that $x = a_{\overline{n}|i}$ and $y = s_{\overline{n}|i}$.

23. A perpetuity consisting of semiannual payments of \$500 each is equally divided among three institutions, **A**, **B**, and **C**. **A** and **B** are to receive their shares in turn, with **C** receiving the remaining perpetuity.

a. If money is worth 4%, compounded semiannually, for what length of time should **A** and **B**, respectively, receive the semiannual payments before **C** receives its share?

b. What partial payments will each receive and on what payment dates will they receive them?

Ans. **A**, \$398.73 (26th pay't date); **B**, \$137.97 (82d pay't date).

24. *a.* How long will it take for an asset of value S to be reduced to $\frac{S}{2}$ at a simple discount rate d?

b. Check the result found in *a* by taking $S = \$2,000$ and $d = .05$.

25. Solve the preceding Ex. 24, parts *a* and *b*, using $d = .05$ as a compound discount rate instead of a simple discount rate. *Ans. a,* $\frac{\log .5}{\log (1 - d)}$; *b,* 13.5 +.

26. When will an asset valued at \$2,000, which is depreciating (being discounted) at a simple discount rate $d = .06$, be equal in value to an investment of \$1,000 which is growing at a simple interest rate of $r = .06$? What is this value?

27. Answer the questions of Ex. 26 if the rates given are effective rates of compound discount and compound interest respectively. *Ans.* (*a*) $\frac{\log 2}{\log 1.06 - \log .94}$, (*b*) \$1,399.58.

28. Using on the time scale 0, 1, $1\frac{1}{2}$, 2, and 5 years successively as comparison dates, find when a single payment of \$8,000 will pay off two debts of \$3,000 due immediately and \$5,000 due in 18 months, when (*a*) money is worth (.06, $m = 1$) and evaluation is made by the exact method, (*b*) money is worth (.06, $m = 1$) and evaluation is made by the approximate method, and (*c*) the interest rate is 6%, simple interest. What general statement may be made from these results?

29. P dollars are to be repaid by 10 equal semiannual instalments which include interest at rate (j, $m = 2$). After paying interest on the outstanding debt at the time of the first repayment, there is \$107.11 remaining to apply on the debt. Of the last repayment there is left, after paying interest, \$133.77 to apply on the debt. Find (*a*) P, j, and (*b*) the semiannual instalment.

Ans. (*a*) \$1200, .05; (*b*) \$137.11

30. A company offers 5% bonds to the amount of \$75,000 in three issues of \$25,000 each. They are to be redeemed as follows: One issue is redeemed as an annuity bond over the next 15 years, to yield the investor 4%; a second issue pays the dividends annually for the first 5 years and then is redeemed as an annuity bond over the succeeding 10 years, to yield the investor 5% over the complete 15 years; the third issue pays annual dividends for the first 10 years and is then redeemed as an annuity bond over the next 5 years, to yield the investor 6% over the complete period.

a. What cash sum is raised if the complete issue is sold immediately?

b. Find the annual expense to the company to pay the required dividends and redeem the bonds.

31. A certain institution will allow 3% on contributions to a savings account. A deposits \$800 to begin an account, and every second year thereafter for the following 12 years he adds \$250 except on the 8th year, when he withdraws \$500 and deposits nothing. What is the value of the account at the end of the 12 years? *Ans.* \$3,844.49.

32. An apartment house will produce a monthly net income of \$300. What cash sum may an investor who can accumulate a sinking fund for replacement of capital at 3%, compounded semiannually, offer for a 10-year lease of the property if he desires 7% on his investment?

33. Two $12,000, 5% bonds were issued 10 years ago. One bond was issued as an annuity bond to be redeemed in 15 years; the other, a serial bond, was to be redeemed by annual repayments of $800. What price should be paid for each of these bonds today, the dividend payments having just been made, if the investor is satisfied to make (.04, $m = 2$) on his investment? *Ans.* $12,818.17; $12,743.79.

34. A bond issue pays dividends at the rate (.04, $m = 4$) for the next 7 years and at the rate 5% annually for the 5 years thereafter. Find to four decimal places the effective yield rate if bought today at 95.

35. Five years ago **A** bought a lot for $2,500 and erected on it a house at a cost of $7,500. The building has appreciated $300 each year. The return at the end of each year has been 5% on the total value at the beginning of the year. If the earnings have been reinvested at 5%, (*a*) what is the value of the property at the present time, and (*b*) what is the accumulated value of the earnings? *Ans.* (*a*) $14,420.50, (*b*) $2,900.50.

36. **A** owes two debts on which he is paying interest semiannually: one a debt of $2,000 due in 2 years, the interest payments being at the rate (.03, $m = 2$); the other a debt of $4,000, due in 5 years, on which he pays $120 interest each 6 months. Assuming that money is worth (.04, $m = 2$), find for how long a note must be drawn to replace equitably these two debts if the note is made for $6,000, with interest made payable semiannually at the rate (.05, $m = 2$).

37. At the end of 16 months an investor sells his holdings for $1.0403 on each dollar invested. Using simple interest for the fractional interest period involved, determine the effective interest rate, i, yielded by the investment. *Ans.* .03.

38. **A** borrows $250 from **B** and repays this sum, with interest, 4 months later. Find which of the following four methods would yield a maximum return to **B** and which would result in a minimum cost to **A**: (*a*) 6% simple interest, (*b*) 6% compound interest, (*c*) 6% simple discount, or (*d*) 6% compound discount.

NOTE. The questions in the above problem can be answered with the aid of the binomial theorem and without actual numerical evaluation.

39. With the aid of a diagram rewrite each of the following in a form in which it may be evaluated by tabulated functions:

(*a*) $1200 \cdot {}^{(4)}a^{(12)}_{\overline{10\frac{1}{12}}|.04}$.

(*b*) $300 \cdot a^{(2)}_{\overline{7\frac{1}{2}}|.04}$.

(*c*) $1200 \cdot {}_{3|}{}^{(4)}\$^{(4)}_{\overline{5}|.04}$.

(*d*) $240 \cdot {}^{(4)}a^{(12)}_{\overline{\frac{20}{12}}|.04}$.

40. A syndicate invests $10,000 in each of two enterprises, **A** and **B**. One of the investments turns out to be a good one, and one turns out to be a bad one. If **A** grows in value at 8% annually for the first 5 years, while **B** decreases by 8% annually for the same period, does the syndicate just break even on the $20,000 invested? If not, what is the net result at the end of the 5 years?

41. **A** has a $20,000 insurance policy on which all premiums have been paid, but which does not mature until 10 years from now. The policy has a loan value of $13,838.00. **A** borrows this sum, paying 6% annually on the loan, and reinvests the loan in an enterprise which yields 12% annually. If the annual profit from this investment (interest received less interest paid out) is evaluated at the current rate of interest, (.03, $m = 2$), how much better off is **A** when he receives the face of the policy, less the loan, 10 years hence? *Ans.* $9,589.09.

42. **A** must choose between two machines for a certain job. One costs $250, with a salvage value of $50 at the end of 6 months; the other costs $375, with a salvage value of $75 at 9 months. On the assumption of equal output and upkeep, which is the more equitable purchase, money being worth (.04, $m = 4$)?

43. An issue of $20,000, 5% bonds is bought 4 years and one month before date of maturity, to yield the investor 6%. What is the quotation on the date of sale? *Ans.* $19,294.52.

44. A debt P, bearing interest at a rate r per period, is being amortized by equal periodic payments of R. Show that the total debt repaid at the end of k periods is $(R - P \cdot r)s_{\overline{k}|r}$. Make a numerical check of this statement, using the schedule from the illustrative example of Section 33.

45. Prove that $d(1 + i)^n \cdot (a_{\overline{n}|i})^2 = (s_{\overline{n}|i} - a_{\overline{n}|i})(1 - d)$.

46. An alumnus offers his college the use of $50,000 as long as he shall live, provided he is paid 5% annually on this sum. The college can borrow money at 4%. How long would the alumnus have to survive to make it preferable for the college to borrow the money rather than to accept the offer of the alumnus?

47. A fund will allow interest at (.03, $m = 12$). **A** deposits $4,000 in the fund immediately, while **B** deposits $50 at the end of each month. At the end of what conversion period will the values of the accounts of **A** and **B** be most nearly equal? Give these amounts. *Ans.* At 89th period, $4,995.40 and $4,976.98.

48. A certain farm yields, on the average, an income of $30 per acre. Proper drainage at a cost of $70 per acre will increase the annual yield by 20%. If money is worth 4%, how long will it be before the installation of the drainage system begins to show a net profit, i.e., profit in excess of the cost.

49. A bank makes loans of $100, the borrower paying $3.65 in advance and repaying the loan by equal monthly payments during the following year. In order to receive the same return on its investment, what monthly payment must the bank require on $100 loans if, instead of the $3.65 paid in advance, the loan is to be amortized by monthly payments for one year? *Ans.* $8.65.

50. **A** is accumulating a sinking fund of $10,000 by equal semiannual payments over a period of 12 years. After 7 years the interest rate is reduced from (.05, $m = 2$) to (.04, $m = 4$). What addition must be made to the semiannual deposits to offset the reduction in the interest rate?

PART TWO

Life Insurance

CHAPTER IX

BENEFITS DETERMINED DIRECTLY FROM LIFE TABLES

68. Introduction. One of the most fundamental principles emphasized in Part One was that, when making a comparison of obligations, all evaluations must be made on a common date. This procedure was necessary because operation of interest was assumed in all transactions involving money. There are, however, monetary obligations into which considerations of interest do not enter. Moreover, there are problems in which factors other than interest, or in addition to interest, alter materially the value of the obligation. Illustrations of such problems are numerous.

Let us suppose that a pension payment of $1,000 is to be made to each individual on his 60th birthday and on each succeeding birthday as long as he lives, this amount to be raised, as needed, by current taxation. In order to find the per-capita cost it is obviously only necessary to know the number of persons contributing and the number of persons to whom such payments must be made. The number of persons in each of these groups is readily obtained by a census, and the per-capita cost thus readily determined. No interest considerations enter into the solution of this problem.

There are many so-called games of chance operated either for the sole purpose of profit or for the purpose of attracting trade. For instance, the operator of a concession stand decides to allow any customer who throws an ace (exactly one) in a throw of three dice a "free" box of merchandise valued at $2.50. The operator wishes to know how much he must charge per throw in order to break just even. It can be shown that in the long run we can expect one out of the three dice to turn up an ace 75 times out of 316. Hence the least sum which the operator can charge and expect to break even is 60 cents per throw of three dice.

As a third problem, consider a man who wishes to know what sum he must set aside at the time he is a given age in order to provide $10,000 for his family at the time they are robbed of his support by his death. In order to answer this question, he must know not only the rate of interest at which he can invest his money but also how long it will be before death can be expected to make the $10,000 payable. It will be found that if the man is one of a large group interested in a similar contract, then a properly developed census table will provide the answer to this question of life expectancy.

It is the object of Part Two to give a brief treatment of some problems involving the principles suggested in the above illustrations.

69. Mortality table. A record which gives the number of individuals living at successive age intervals and the number of deaths for the corresponding age intervals constitutes a *mortality table.* There are many technicalities, many assumptions, and many interpretations involved in getting together such a table to serve a particular purpose. A number of mortality tables, based on different population groups,* have been made.

If on a certain date a census were taken of a given group, and the ages recorded as of the last birthday, those giving their ages as 20, say, would vary in actual length of life from exactly 20 years up to $20.\dot{9}\dot{9}$. In general, the average age of such a group would be $20\frac{1}{2}$ years. This enumeration gives what is known as the *mid-population* at that age. Of those dying during the corresponding year one half can be assumed to have died before the middle of the year. Hence, barring other discrepancies, the population at the beginning of the year, called the *initial population,* may be expressed as

[87] $$\textbf{(Initial population)} = \textbf{(mid-population)} + \textbf{(half the number of deaths)}$$

for the age group under consideration.

If out of a large group of individuals, each aged x, a certain number die before reaching age $x + 1$, then the death rate of this group, denoted by the symbol q_x, is defined by the relation

[88] $$q_x = \frac{\textbf{number of deaths at age } x}{\textbf{initial population at age } x}.$$

EXERCISE

The table on the opposite page gives the mid-population and the number of deaths for males in the state of Michigan in 1910.† Complete columns (4) and (5) for ages 10 to 30 inclusive, giving the initial population and the death rate for the respective ages. *Retain this table; further problems* (pages 152 and 153) *will be based on these results.*)

70. Life tables. In addition to the data given in a mortality table, *life tables* present other columns valuable in insurance and related work. For instance, it is valuable and often desirable to have the initial population, for the age at which a particular table is to be made, based on some group of a size different from that of the group being studied. Having established the death rate at successive ages from a study of the particular group under consideration, one may obviously start with any convenient number as the initial group, say 100,000, called the *radix* of the table, and, assuming these death rates, determine the number of deaths and hence the number of survivors from year to year until death has claimed the last survivor.

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* G. King, *Institute of Actuaries Textbook,* Part II. C. E. Layton, London. J. W. Glover, *United States Life Tables, 1890, 1901, 1910, and 1901–1910.* Bureau of the Census.

† J. W. Glover, *United States Life Tables, 1890, 1901, 1910, and 1901–1910,* Table 155.

Michigan Males, 1910, Life Table

Age x (1)	Mid-population (2)	Reported Deaths (3)	Initial Population (4)	q_x (5)
10	26,384	74	26,421	.00280
11	25,122	51	25,148	.00203
12	26,800	57	26,828	. . .
13	26,088	80	. . .	. . .
14	26,673	67	. . .	
15	24,867	67		
16	27,688	82		
17	27,431	96		
18	28,436	130		
19	27,624	153		
20	26,916	121		
21	27,641	154		
22	27,744	175		
23	26,890	139		
24	27,541	139		
25	26,582	145		
26	26,282	154		
27	24,969	157		
28	26,080	150		
29	22,458	135		
30	26,912	139		

As a convenience in further discussion we shall use the following notation:

(x) = an individual aged x;
l_x = the number of individuals who, according to the mortality table, attain the precise age x in any year of time;
d_x = the number out of the l_x attaining age x who die before reaching age $x+1$;
q_x = the rate of mortality (death rate) for persons aged x;
p_x = the rate of survival for persons aged x.

In terms of this notation we may, from the relation $q_x = \frac{d_x}{l_x}$, express the number dying at age x as

[89] $$d_x = q_x \cdot l_x;$$

and the number of survivors, l_{x+1}, may evidently be expressed as

[90] $$l_{x+1} = l_x - d_x.$$

EXERCISE

Taking 100,000 as a radix at age 10, i.e., $l_{10} = 100{,}000$, and using the death rates determined in the exercise on page 150, continue the table begun in that exercise, adding l_x and d_x in columns (6) and (7) as indicated below, for x from 10 to 30 inclusive.

COLUMNS (1) TO (5) APPEAR IN TABLE ON PAGE 151					l_x	d_x
(1)	(2)	(3)	(4)	(5)	(6)	(7)
10	. . .	. . .	. . .	.00280	100,000	280
11	. . .	. . .	. . .	.00203	99,720	202
12	. . .	. . .	. . .	.00212	99,518	211
13	. . .	. . .	. . .	.00306	99,307	. . .
14	. . .	. . .	. . .	.00251	. . .	. . .
. . .	. . .	. . .	. . .	. . .	. . .	. . .

Since out of the l_x persons entering a given year at age x there are l_{x+1} who complete the year, the quotient $\frac{l_{x+1}}{l_x}$ defines the rate of survival of persons aged x, i.e.,

[91] $$p_x = \frac{l_{x+1}}{l_x}.$$

Moreover, from the relation $l_{x+1} = l_x - d_x$, one may, by dividing each member of this equation by l_x, obtain immediately the very useful relation between p_x and q_x, namely,

[92] $$p_x = 1 - q_x.$$

The fact that $p_x + q_x = 1$ often provides algebraic simplification of the many relations having to do with symbols used in life tables.

Just as the census (mid-population) served as a basis for setting up a table of l_x and d_x, based on a given radix, we may reverse the process and from these values set up the corresponding hypothetical mid-population. Denoting this mid-population by L_x, we have, then,

$$L_x = l_x - \tfrac{1}{2} d_x,$$

or

[93] $$L_x = \tfrac{1}{2}(l_x + l_{x+1}).$$

This expression is sometimes written as $L_x = l_{x+\frac{1}{2}}$.

71. Expectation of life. As a final addition to the table begun in the exercise on page 150, we should like a column which would answer the question "Having attained age x, how long, on the average, may an individual be expected to survive?" The complete number of years lived by persons aged x would evidently be $l_{x+1} + l_{x+2} + l_{x+3} + \cdots + l_\omega$, where ω (Greek letter omega) is the age of the last survivor at the time of death. This total number of years equally divided among those living at age x would be the average number of complete years lived by each member of the group. However, since, on the average, each person lives one-half year longer than this, and since we assume that deaths are equally distributed throughout the year, we have the *complete expectation of life*, denoted by the symbol $\mathring{e}_x$, defined as

$$[94] \qquad \mathring{e}_x = \frac{1}{2} + \frac{l_{x+1} + l_{x+2} + \cdots + l_\omega}{l_x}.$$

An abbreviation for "the sum of all such terms as l_{x+t}, where t takes on all values from 1 to $\omega - x$," is $\sum_{t=1}^{\omega-x} l_{x+t}$. In this notation the *curtate expectation of life* is defined by the relation

$$[95] \qquad e_x = \frac{\sum_{t=1}^{\omega-x} l_{x+t}}{l_x}.$$

EXERCISE

Continue the table begun in the previous exercises (pages 151 and 152) by adding Σl_{x+1} and $\mathring{e}_x$ as columns (8) and (9), given that $\sum_{t=1}^{\omega-30} l_{30+t} = 3,375,396$.

72. Other life-table relationships. If, out of the l_x persons alive at age x, d_x die during the following year, d_{x+1} during the second year, and so on, with d_{x+n-1} dying during the nth year following age x, one may express the total number dying in the n-year interval x to $x + n$ as

$$l_x - l_{x+n} = d_x + d_{x+1} + d_{x+2} + \cdots + d_{x+n-1}.$$

Moreover, when $l_{x+n} = l_{\omega+1} = 0$, the above equation becomes

$$l_x = d_x + d_{x+1} + \cdots + d_\omega.$$

$$= \sum_{t=0}^{\omega-x} d_{x+t}.$$

The total number of individuals living at the successive ages x to $x + n$ inclusive is obviously the total number at all ages less the number at $x + n + 1$ and above. This number is readily expressed as

$$\sum_{t=0}^{n} l_{x+t} = \sum_{t=0}^{\omega-x} l_{x+t} - \sum_{t=n+1}^{\omega-x} l_{x+t}$$

If out of the l_x persons alive at age x there remain l_{x+n} alive at age $x + n$, the rate of survival for the n years, denoted by the symbol ${}_np_x$, is expressed by the ratio

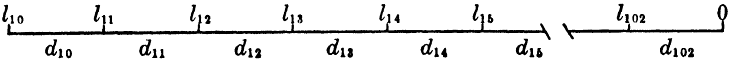
$$[96] \qquad {}_np_x = \frac{l_{x+n}}{l_x}.$$

Moreover, since the ratio

$$\frac{l_{x+n}}{l_x} = \frac{l_{x+1}}{l_x} \cdot \frac{l_{x+2}}{l_{x+1}} \cdot \frac{l_{x+3}}{l_{x+2}} \cdots \frac{l_{x+n}}{l_{x+n-1}},$$

$${}_np_x = p_x \cdot p_{x+1} \cdot p_{x+2} \cdots p_{x+n}.$$

Interpretations of other ratios will be made as needed. In general, a representation of the l_x and the d_x values on a time scale, as shown here,



will help visualize such interpretations. Moreover, the time scale itself may be interpreted either as (*a*) a record of 100,000 individuals whose records have been followed through from age 10 until all have been claimed by death or (*b*) a record of 6,300,785 individuals taken on a given date and varying in age from 10 to 102.

73. Benefits paid from current assessment. There are roughly two types of benefits the costs of which are based on the life tables, namely, (*A*) those which make provision, in the form of annuity payments, for retirement and old age and (*B*) those which provide for a cash sum for the dependents of those who die. Expressions for the per-capita cost of each of these types of benefits will be developed.

A. Annuities. Suppose that each individual, on reaching age $x + m$, is to be paid R dollars, and an equal amount on each successive birthday thereafter, and that the annual expense of these payments is to be borne by current assessment of P made against each person aged x to $x + n$ inclusive. Since the *amount to be paid out must be equal to the amount collected,* no interest accumulations being involved, we have immediately

$$P(l_x + l_{x+1} + \cdots + l_{x+n}) = R(l_{x+m} + l_{x+m+1} + \cdots + l_\omega);$$

and the annual cost per capita will be, therefore,

$$\text{[97]} \qquad P = R \cdot \frac{\sum_{t=0}^{\omega-x} l_{x+t}}{\sum_{t=0}^{\omega-x} l_{x+t} - \sum_{t=n+1}^{\omega-x} l_{x+t}}.$$

One may readily prove that although the values of l_{x+t} (that is, the number of persons living at age $x + t$ based on a radix of 100,000) are not the same as the actual population to be provided for, nevertheless the per-capita cost is exactly given by the use of the values from the hypothetical population, since the ratios involved in calculating P are exactly the same in the two populations. For instance, each term in the equation which was solved for P to obtain [97] may be divided by l_x, thus expressing the result as the sum of successive rates of survival, which are of course the same for any radix, including one equal to that of the original population.

EXERCISES*

1. Determine the annual cost to each male resident of Michigan, of age 21 and above, providing a payment of $1,200 to each male on his 65th birthday and a similar amount on each birthday thereafter. $\left(\sum_{t=0}^{\omega-65} l_{65+t} = 695{,}655.\right)$ *Ans.* $193.43.

2. In Ex. 1, if only persons from age 21 to age 64 inclusive were taxed (assessed) to provide for the annual pension payments, what would be the per-capita cost?

3. Assuming that the life table derived from the Michigan 1910 census properly represents the population of a large industrial organization, what sum must each member of the organization from age 20 to 50 inclusive pay in each year to provide $1,000 each year for the retired members of ages 51 to 65 inclusive?

$$\left(\sum_{t=0}^{\omega-51} l_{51+t} = 1{,}667{,}997, \quad \sum_{t=0}^{\omega-66} l_{66+t} = 638{,}376.\right) \quad \textit{Ans. } \$375.15.$$

4. On the assumption that $\frac{d_x}{12}$ individuals die each month following age x, find the annual per-capita cost to finance a monthly pension of $250 to all persons aged 60 and above, the cost to be borne by all males who are 20 or more years old. $\left(\sum_{t=0}^{\omega-60} l_{60+t} = 1{,}011{,}043, l_{60} = 66{,}620.\right)$

5. Show that the annual assessment which must be made against all males aged x and above, to provide all males aged $x + n$ and above a monthly pension of M dollars, is given by the expression

$$P \cdot \sum_{t=0}^{\omega-x} l_{x+t} = M\{12[l_{x+n} + l_{x+n+1} + \cdots + l_\omega] - \tfrac{11}{2}[d_{x+n} + d_{x+n+1} + \cdots + d_\omega]\},$$

or

$$P = \frac{R \cdot \left[\sum_{t=n}^{\omega-x} l_{x+t} - \frac{11}{24} l_{x+n}\right]}{\sum_{t=0}^{\omega-x} l_{x+t}}.$$

B. Death benefits. If a group, each of whom realizes that his death means loss of support for his dependents, agrees to assess each member a sum P sufficient to provide R dollars for the dependents of each member of the group at the time of his death, then it is again only necessary to enumerate those who contribute and those who are claimed by death, in order to determine the individual cost. If all individuals from age x to age $x + n$ inclusive are to share equally the cost due to deaths occurring to individuals from age $x + m_1$ to $x + m_2$ inclusive, then

$$P[l_x + l_{x+1} + \cdots + l_{x+n}] = R \cdot [d_{x+m_1} + d_{x+m_1+1} + \cdots + d_{x+m_2}],$$

or

$$P = \frac{R \cdot [l_{x+m_1} - l_{x+m_2+1}]}{\sum_{t=0}^{n} l_{x+t} - \sum_{t=n+1}^{\omega-x} l_{x+t}}. \qquad [98]$$

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* Values from the life table, not previously computed in the exercises, are supplied in the problems.

EXERCISES

1. What will be the annual cost to each individual aged 20 and over to provide $1,000 to the dependents of each individual at the time of death, where death occurs after reaching age 20? *Ans.* $21.95.

2. *a.* Each of a large group of persons, age 25, agrees to pay a sum sufficient to provide $1,000 for the dependents of each of its members who dies before reaching age 26. On the basis of the Michigan Males, 1910, Life Table (Ex. 1, page 151), what will be each individual's share of the cost?

b. Answer the similar question for a group of persons, age 50, who die before reaching age 51. ($l_{50} = 78{,}360$, $d_{50} = 908$.)

3. All persons between the ages 20 and 59 inclusive are to pay an annual assessment which will provide a $2,500 payment to the estate of each person who dies before age 60. Determine the annual individual assessment which will provide for this expense. $\left(\sum_{t=0}^{\omega-60} l_{60+t} = 1{,}011{,}043,\ l_{60} = 66{,}620.\right)$ *Ans.* $22.23.

4. All individuals between the ages of 40 and 59 inclusive are to set aside sufficient to pay each one reaching age 60 the sum of $5,000. On the basis of the Michigan Males, 1910, Life Table, what is the sum to be set aside by each individual? $\sum_{t=0}^{\omega-40} l_{40+t} = 2{,}575{,}215.$

5. What sum paid by each person between age 30 and age 59 inclusive will provide $5,000 to the dependents of each person who dies between these ages, and also $5,000 to each person attaining age 60? $\left(\sum_{t=0}^{\omega-60} l_{60+t} = 1{,}011{,}043.\right)$ *Ans.* $186.48.

74. The American Experience Table. The tables which we have set up and used thus far, based on the male census of Michigan, 1910, although sufficiently accurate for some types of work, have some noticeable disadvantages. A careful study of the original census figures shows that there is a marked tendency to record ages as of the even ages and as multiples of 5 and of 10. Although this is always characteristic of census statistics, it is hardly a reflection of the exact truth. The irregularity of population statistics is in turn reflected in the death rates, which, instead of increasing with age as in general they should, noticeably decrease at many ages.

The construction of a reliable and thoroughly adequate life table is in itself a fairly long and complicated study.* It is sufficient here to point out that several well-known life tables have been developed. One of the most widely used of these is the American Experience Table, constructed in 1860 from the experience of one of the large insurance companies. Unless otherwise specified, we shall use this table as the basis for all further numerical problems.

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* Hugh H. Wolfenden, *Population Statistics and their Compilation.* Actuarial Society of America, 256 Broadway, New York.

EXERCISES

1. Using the ages, the x's, as abscissas and the corresponding values of q_x as ordinates, exhibit on the same co-ordinate axes the resulting graphs from the Michigan Males, 1910, Life Table and the American Experience Table.

2. Fill in the blank spaces in the following mortality table:

x	l_x	d_x	q_x	p_x
95	361	- - ? - -	- - ? - -	- - ? - -
96	- - ? - -	83	- - ? - -	- - ? - -
97	161	57	- - ? - -	- - ? - -
98	104	- - ? - -	.7500	- - ? - -
99	- - ? - -	- - ? - -	.6250	- - ? - -
100	- - ? - -	- - ? - -	- - ? - -	- - ? - -
101	- - ? - -	10	- - ? - -	.5000
102	- - ? - -	- - ? - -	- - ? - -	- - ? - -
103	8	- - ? - -	- - ? - -	.2000

3. The symbol T_x is defined as $\sum_{t=0}^{\omega} L_{x+t}$. Show that

$$\sum_{t=1}^{\omega} l_{x+t} = T_x - \tfrac{1}{2} l_x.$$

4. Using the values of l_x and d_x from the American Experience Table, solve Exs. 1 and 3, page 155, and Exs. 1 and 3 on page 156. Compare the results with those obtained when using the tables based on the Michigan Males, 1910, Life Table.

CHAPTER X

LIFE ANNUITIES

75. Introduction. Although the government and other agencies are providing pensions and annuities in various forms for a large number of individuals, there is still a large proportion of the provision for retirements and old age which is self-provided. An individual who, looking ahead, wishes to provide for retirement with a fixed income for the remainder of his life usually purchases such an annuity from an annuity or insurance company. Or, again, an individual who wishes to provide for a single sum to be used at some future date, provided he is still alive at that time, finds such contracts offered by the insurance companies. In either of these problems the amount which is to be paid back to the individual is contingent upon his being alive to receive it.

In this chapter we shall be chiefly interested in determining the price, *exclusive of overhead cost,* which (x) must pay for these benefits to be received in later life. If the purchase price is to be paid in a single sum, it is called the *net single premium* and it is equal to the present value of the benefits to be received. More often the price is met by annual premiums made over a period of years. The present value of the annuity formed by the annual premiums is also equal to the present value of the benefits.

Of the several methods for obtaining general expressions for the solution of the problems under consideration, we shall use what is generally known as the *mutual-fund method* of approach. The method consists merely in assuming that the members of a sufficiently large group agree to share the expense necessary to provide the benefits desired for their survivors or their dependents. For a sufficiently large group the ratios between the l_x's and d_x's as given in the life tables can be assumed to represent reliably the populations under consideration. Expressions for the per-capita cost are thus readily set up.

76. A pure endowment. The value of a single payment to be made to (x) on some future date, provided he is then alive, is called a *pure endowment.* In particular, an $\$R$, n-year pure endowment to a person aged x is defined as a contract to pay $\$R$ to (x) if and when he reaches age $x+n$.

Let us denote by ${}_nE_x$ the sum which each of the l_x persons contributes in order that each of the l_{x+n} survivors at the end of n years shall receive \$1 on reaching age $x+n$. If the total sum contributed is invested at rate i, it must accumulate to l_{x+n} dollars at n years. We have then

$${}_nE_x \cdot l_x \cdot (1+i)^n = l_{x+n},$$

$$[99] \qquad {}_nE_x = \frac{v^n \cdot l_{x+n}}{l_x}.$$

The symbol ${}_nE_x$ is usually referred to as the *present value of the pure endowment.*

For the purpose of evaluation, tables have been prepared giving the values of the products of the form $v^x \cdot l_x$. If, then, we multiply both numerator and denominator of the fraction in [99] by v^x, and denote by D_{x+n} the product $v^{x+n} \cdot l_{x+n}$, we have, as the present value of an $\$R$, n-year pure endowment,

$$R \cdot {}_nE_x = R \cdot \frac{v^{x+n} \cdot l_{x+n}}{v^x \cdot l_x}, \qquad \text{or}$$

[100] $$R \cdot {}_nE_x = R \cdot \frac{D_{x+n}}{D_x}.$$

As indicated above, the expression in [100] may be called the net single premium which will provide (x) with $\$R$ if he is alive at age $x + n$.

EXERCISES

1. Using an interest rate of 3%, calculate the values of D_x corresponding to the ages 10 to 30 inclusive, based on the Michigan Males, 1910, Life Table. (*Preserve this table, as there are other* ***commutation*** *symbols to be added in later exercises.*)

2. An individual, now aged 20, is promised \$1,500 when he reaches age 35. Find the present value of this promise (*a*) using the American Experience, 3%, Table and (*b*) using the Michigan Males, 1910, Life Table.

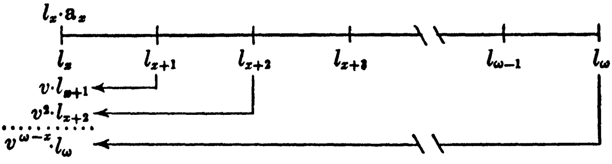
3. A has \$750 with which he wishes to purchase a pure endowment to be paid when he attains age 50. If he is now 28 years of age, what sum will he receive if alive at age 50? *Ans.* \$1,788.59.

4. A father wishes to provide \$5,000 for his son's 21st birthday and \$20,000 on his 35th birthday. The son is now 12 years of age. What net sum should a company operating on the American Experience, 3%, Table charge for these benefits?

77. Life annuities. A series of periodic payments made contingent upon the life of an individual (more generally, lives of one or more individuals) is termed a *life annuity*. In contrast to the annuity certain, $1 \cdot a_{\overline{n}|i}$, with which we are already familiar, the periodic payments of $R = \$1$, instead of being made for a definite time, n, are made contingent upon (x) remaining alive to receive them.

NOTE. Since the *annuity due* occupies the position of importance in insurance and life-annuity practice, we shall always understand the annuity payments to be made *at the beginning of the interval*, unless otherwise specified, throughout the remainder of the text.

Since the present value of a whole life annuity to (x) — that is, payments of \$1 at the beginning of each year to (x) so long as he shall live — is dependent upon the age and is not of a certain duration, it is denoted by the symbol a_x; in this symbol the age x replaces the "n certain" symbol $_{\overline{n}|}$, and the rate i is omitted because any particular insurance or annuity company always operates on the same interest basis. If, then, each of l_x persons contributes $\mathbf{a}_x$ dollars, this sum, if placed at interest at rate i, will provide \$1 to each of those remaining alive at age x, \$1 to each one surviving to age $x + 1$, \$1 to each one surviving to age $x + 2$, and so on, up to and including \$1 to the last survivor at age ω. Evaluating all of these payments at the present, we have



$$l_x \cdot \mathbf{a}_x = l_x + v \cdot l_{x+1} + v^2 \cdot l_{x+2} + \cdots + v^{\omega-x} \cdot l_\omega.$$

On multiplying each member of this equation by v^x and solving for $\mathbf{a}_x$, the present value of a life annuity of \$1, issued to a person aged x, becomes

$$\textbf{[101]} \qquad \mathbf{a}_x = \frac{D_x + D_{x+1} + D_{x+2} + \cdots + D_\omega}{D_x}.$$

The summation of the D_x's has also been tabulated for the various life tables and for various rates of interest. Using the definition

$$\bar{N}_x = D_x + D_{x+1} + D_{x+2} + \cdots + D_\omega,$$

the present value of a *whole life annuity* of annual rent \$1, and issued to a person aged x, is

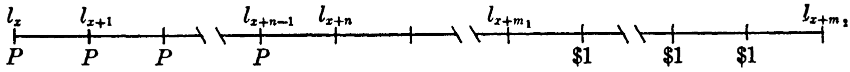
$$\textbf{[102]} \qquad \mathbf{a}_x = \frac{\bar{N}_x}{D_x}.$$

NOTE. The "open bar" $\bar{N}$ is used here in preference to the ordinary N used in the English texts. In such texts $N_x = D_{x+1} + D_{x+2} + \cdots + D_\omega$. The symbols D_x and $\bar{N}_x$ introduced above are known as *commutation symbols*. Others will be introduced as needed.

If, instead of (x) receiving payments throughout his whole life, payments are limited to a period of n years, say, then the annuity is called a *temporary life annuity* for n years. The present value of such an annuity is designated by the symbol $\mathbf{a}_{x:\overline{n}|}$, where the n certain means that the payments are *to continue no longer* than n years, the duration being fewer than n years should n survive (x). From the detailed discussion of the previous paragraph one readily obtains the relation

$$\textbf{[103]} \qquad \mathbf{a}_{x:\overline{n}|} = \frac{\bar{N}_x - \bar{N}_{x+n}}{D_x}.$$

In many cases annuity contracts are sold to provide a fixed periodic income for some later period in life. Moreover, the cost of such an annuity, instead of being met by a single cash payment, is paid for by annual payments during the earlier years of life. In particular, if annual premiums of P are paid by each person alive at age x, at age $x + 1$, and so on up to and including age $x + n - 1$, to provide \$1 annually to each survivor at ages $x + m_1$ to $x + m_2 - 1$ inclusive, the payments and the individuals involved may be pictured thus:



Denoting a deferred annuity by the general symbol for deferment used in Part One, we may therefore write

$$P\,[N_x - N_{x+n}] = \$1 \cdot [N_{x+m_1} - N_{x+m_2}],$$

or

[104] $$P = \frac{{}_{m_1|}\mathrm{a}_{x:\overline{m_2-m_1}|}}{\mathrm{a}_{x:\overline{n}|}}.$$

EXERCISES

1. Add to the commutation symbols for the Michigan Males, 1910, Life Table, begun in Ex. 1, page 151, a column of N_x for values of x from 10 to 30 inclusive, given that $N_{40} = 504{,}949.4$.

2. An annuity of annual rent R is issued to an individual aged x, providing m annual payments, the first one made to (x) when he has attained age $x + n$. Derive in detail the formula for its present value, expressing the result in the form

$$R \cdot ({}_{n|}\,\mathrm{a}_{x:\overline{m}|}) = R \cdot \frac{N_{x+n} - N_{x+n+m}}{D_x}.$$

3. *a.* An individual now 30 years of age wishes to purchase a whole life annuity of \$2,500 per year. What will be the net single premium?

b. What would be the price if the individual were 50 years of age?

Ans. a, \$52,732.39; *b*, \$38,177.56.

4. An individual is to receive an annual pension of \$500, beginning at age 65. What is the present value of the pension if the individual is now aged 40?

5. What net single premium paid by an individual aged 30 will provide an annuity of \$1,500 per year, the first payment to be made at age 60? *Ans.* \$3,195.58.

6. An individual now 25 years of age purchases an annuity which will pay him \$2,000 from age 60 to age 75 inclusive. The contract calls for 20 annual premiums, the first one to be paid immediately. Determine the size of this premium.

7. If, as in the annuity certain, the "script" a denotes an annuity immediate, show that

(a) $$a_x = \frac{N_{x+1}}{D_x}.$$

(b) $$a_{x:\overline{n}|} = \frac{N_{x+1} - N_{x+n+1}}{D_x}.$$

(c) $${}_{n|}a_x = \frac{N_{x+n+1}}{D_x}.$$

8. Show that (*a*) $\text{a}_x = a_x + 1$.

(*b*) $\text{a}_x = 1 + {}_1E_x + {}_2E_x + \cdots + {}_{\omega-x}E_x$.

9. An individual aged 28 promises to pay an annual premium of $48.54 at the beginning of each year for the next 30 years. What is the present value of these premiums? *Ans.* $873.34.

10. Show that if, in formula [104], $m_2 = \omega - x + 1$ and $m_1 = m$, then

$$P = \frac{N_{x+m}}{N_x - N_{x+n}}.$$

Interpret this formula.

11. From the formula of Ex. 10 determine the size of the annual premium which, paid for 20 years, will provide a person now 40 years of age $1,000 each year from age 65 and after. *Ans.* $206.82.

12. **A** is now 10 years of age. His father buys a contract from an insurance company which promises **A** $10,000 on the day he becomes of age, or he may receive the benefits in annual payments over a period of 5 years, the first payment at age 21.

a. What single net premium did the father pay for the contract?

b. If **A** chooses to receive the annuity instead of a single payment at age 21, what annual payment will he receive?

13. An individual has reached age 50 and is now to receive a life annuity, beginning today, of annual rent $1,000. Not needing the money at present, he decides to exchange this contract for a whole life annuity, beginning at age 60. What annual payments will he receive under the new contract? *Ans.* $2,161.65.

14. What is the present value to an individual, aged 30, of a contract which provides for a payment of $5,000 when he reaches age 50 and $1,250 annually thereafter?

78. Forborne annuity. A fund created by equal annual payments made by a group of l_x individuals and their survivors over a period of n years, the payments accumulating at a rate i, provides a *forborne annuity* to each of the survivors at age $x + n$. If the value of a forborne annuity to each of the l_{x+n} survivors be designated by the symbol ${}_nu_x$, then, by the above definition,

$$l_{x+n} \cdot {}_nu_x = l_x \cdot (1+i)^n + l_{x+1} \cdot (1+i)^{n-1} + \cdots + l_{x+n-1} \cdot (1+i),$$

or

$${}_nu_x = \frac{D_x + D_{x+1} + \cdots + D_{x+n-1}}{D_{x+n}},$$

or

$$[105] \qquad {}_nu_x = \frac{N_x - N_{x+n}}{D_{x+n}}.$$

An important special case of this formula is that in which $n = 1$ and hence

$$[106] \qquad u_x = \frac{D_x}{D_{x+1}}.$$

79. Résumé of accumulation and present-value formulas. In the present chapter we have seen that ${}_nE_x$ is the present value of \$1, due in n years. An investment of $\left(\frac{1}{{}_nE_x}\right)$th of this sum — namely $\left(\frac{1}{{}_nE_x}\right) \cdot {}_nE_x$, i.e., \$1 — invested now would therefore provide in n years $\left(\frac{1}{{}_nE_x}\right)$th of \$1, or \$$\left(\frac{1}{{}_nE_x}\right)$. Hence ${}_nE_x$ and $\frac{1}{{}_nE_x}$ are often referred to as the *discount and accumulation factors*, respectively, where the payments involved are dependent upon the survival of (x).

In a similar way $a_{x:\overline{n}|}$ and ${}_nu_x$ are the present value and the accumulated values, respectively, of annuity payments of annual rent \$1, over a period of n years, where again the payments are contingent upon the life of (x). The relation of these two sums, in the light of the interpretation of ${}_nE_x$, is obviously

$$a_{x:\overline{n}|} = {}_nu_x \cdot {}_nE_x. \tag{107}$$

This relation is also readily established algebraically.

From the above discussion it is worth while to note the formulas which play corresponding roles in Parts One and Two of the text.

	Payments, Certain (Part One)	Payments, Contingent (Part Two)
Accumulation factor . . .	$(1+i)^n$	$({}_nE_x)^{-1}$, $\left(\begin{matrix}\textit{Equal to} \\ u_x \textit{ if } n = 1\end{matrix}\right)$
Discount factor	$(1+i)^{-n}$	${}_nE_x$
Annuities:		
a. Present value	$a_{\overline{n}|i}$	$a_{x:\overline{n}|}$
b. Accumulated value . .	$s_{\overline{n}|i}$	${}_nu_x$
Relation, *a* to *b*	$a_{\overline{n}|i} = s_{\overline{n}|i} \cdot (1+i)^{-n}$	$a_{x:\overline{n}|} = {}_nu_x \cdot {}_nE_x$

EXERCISES

1. Show in terms of commutation symbols that $a_{x:\overline{n}|} = {}_nu_x \cdot {}_nE_x$.

2. Show in terms of commutation symbols that $\frac{1}{{}_1E_x} = u_x$.

CHAPTER XI

LIFE INSURANCE

80. Introduction. In contrast to the life annuities in which the payments are dependent upon the number of individuals living, i.e., the l_x's, the benefits made payable by a life-insurance contract are dependent upon the d_x's, the number of deaths.

A life-insurance *policy* is a contract issued to an individual (x), aged x, called the *policyholder*, which promises to pay a certain sum, F, called the *face* of the policy, to the dependents of (x), called the *beneficiaries*, at the *end of the year* in which (x) is taken by death. In return for these benefits (x), the insured, must pay a *premium* (or premiums, if the cost is spread over a period of years). The size of the premium is determined by the number of individuals in the insured group who are alive to contribute at the specified ages and by the number of deaths which occur during the specified period.

The word "premium" as used in all future discussion shall always mean a *net premium*, that is, payments which, accumulated at interest, are exactly sufficient to pay all claims where deaths occur according to the mortality table. Office, or gross, premiums vary widely, the amount added to the net premium being controlled largely by the company issuing the contract.

Although there are a great many types of insurance contracts written, a large portion of the insurance business is included in three general classifications, namely, *term insurance*, *whole life insurance*, and *endowment insurance*. We shall discuss each of these briefly and derive formulas for the *net premiums* required to purchase such contracts.

81. Term insurance. A \$1, n-year term insurance on the life of (x) promises a payment of \$1 at the end of the year in which death occurs, provided death occurs prior to age $x + n$.

Denoting by $A^{1}_{x:\overline{n}|}$ the net single premium which each of the l_x persons must contribute in order that the beneficiary of each individual dying in the interval x to $x + n$ shall receive \$1, and equating the total contribution to the present value of the total which must be paid out to the beneficiaries, we have

$$l_x \cdot A_{\overset{1}{x}:\overline{n}|} = v \cdot d_x + v^2 \cdot d_{x+1} + \cdots + v^{x+n} \cdot d_{x+n-1}.$$

Multiplying each member of the equation by v^x and introducing the new commutation symbol $C_x = v^{x+1} \cdot d_x$, we may write

$$A^{1}_{x:\overline{n}|} = \frac{C_x + C_{x+1} + \cdots + C_{x+n-1}}{D_x}. \qquad [108]$$

As a further simplification the sum of the C_x's is defined by the relation $M_x = C_x + C_{x+1} + \cdots + C_\omega$, and the net single premium for an n-year term insurance of \$1 may be written as

$$A^{1}_{x:\overline{n}|} = \frac{M_x - M_{x+n}}{D_x}. \tag{109}$$

In the notation $A^{1}_{x:\overline{n}|}$, the number 1 over the x signifies that (x) must die before the expiration of n years, sometimes stated by saying that n must survive (x). This would suggest as an alternate notation for ${}_nE_x$ the symbol $A_{x:\overline{n}|}^{\;\;\,1}$, since in this case n must survive (x), i.e.

$${}_nE_x = A_{x:\overline{n}|}^{\;\;\,1}$$

If instead of purchasing the \$1, n-year insurance contract by a net single premium, the cost be met by annual premiums of $P^{1}_{x:\overline{n}|}$ over the n years, the size of the annual premium is readily found from the fact that these premiums form an annuity whose present value is $A^{1}_{x:\overline{n}|}$. We have, therefore,

$$P^{1}_{x:\overline{n}|} \cdot \mathbf{a}_{x:\overline{n}|} = A^{1}_{x:\overline{n}|}, \tag{110}$$

or, in terms of commutation symbols,

$$P^{1}_{x:\overline{n}|} = \frac{M_x - M_{x+n}}{N_x - N_{x+n}}. \tag{111}$$

It will be noticed that the subscripts of M in the numerator indicate when the insurance protection begins and when it ends, while the subscripts of N in the denominator indicate when the premium payments begin and when they end. For this reason the D_x in the denominator of formula [109] above is sometimes replaced by its equal in terms of N_x, namely, $D_x = N_x - N_{x+1}$.

In case the term of the insurance is for only one year, the premium is called the *natural premium*, and although obviously $P^{1}_{x:\overline{n}|} = A^{1}_{x:\overline{n}|}$, neither symbol is used. It is customary to use a small c_x as the symbol for the natural premium, thus:

$$\textbf{Natural premium} = c_x = \frac{C_x}{D_x}. \tag{112}$$

This premium is frequently met in connection with other forms of insurance.

EXERCISES

1. Compute to the nearest cent the numerical value of the net single premium for a \$1,000, n-year term policy issued to an individual aged 30 if (*a*) $n = 5$; (*b*) $n = 10$; (*c*) $n = 50$. *Ans.* (*a*) \$38.79, (*b*) 73.14, (*c*) 352.06.

2. An individual aged 50 has \$1,250 which he intends to invest in a 10-year term-insurance policy. On a net-premium basis, how much insurance can the individual purchase with this sum?

3. Find the natural premium per $1,000 (*a*) for an individual aged 20; (*b*) for an individual aged 75. *Ans.* (*a*) $7.57, (*b*) $91.62.

4. Show that the annual premium for an *n*-payment, *m*-year term insurance, denoted by the symbol ${}_nP^1_{x:\overline{m}|}$, issued to an individual aged x, may be expressed as

$$ {}_nP^1_{x:\overline{m}|} = \frac{M_x - M_{x+m}}{N_x - N_{x+n}}.$$

5. Using the formula given in Ex. 4, find the premium which, if paid each year for 10 years, will provide an individual aged 35 with a 25-year term insurance of $1000. *Ans.* $23.03.

82. Whole life insurance. An insurance policy which provides for a fixed sum to be paid to the beneficiary at the time of the death of the insured is called a *whole life policy.* This type of insurance is sometimes called *ordinary* or *straight life* insurance. The net single premium for such a contract is the present value, under the assumption of a fixed rate of mortality at the successive ages and a fixed rate of interest, of the amount payable at the end of the year in which death occurs.

Obviously, term insurance becomes ordinary life insurance when $x + n = \omega$. In such a case n and the 1 over the x in the symbolic notation for the premiums are omitted, the net single premium and the annual premium being denoted by A_x and P_x respectively. Hence, if each of the l_x individuals contributes a sum A_x, and this amount is placed at interest at rate i, it will provide the beneficiary of each person $1 at the end of the year of death, and we have

$$l_x \cdot A_x = v \cdot d_x + v^2 \cdot d_{x+1} + \cdots + v^{\omega - x + 1} \cdot d_\omega.$$

Reducing this equation to commutation symbols and solving for A_x, we have

$$A_x = \frac{M_x}{D_x}. \qquad [113]$$

If the net single premium is replaced by annual premiums of P_x, then the present value of the annuity of annual rent P_x must be equal to A_x, and hence

$$P_x \cdot \mathrm{a}_x = A_x,$$

or

$$P_x = \frac{A_x}{\mathrm{a}_x}. \qquad [114]$$

In terms of commutation symbols the above formula [114] may obviously be written as $P_x = \dfrac{M_x}{N_x}$.

A *limited-payment life policy* differs from an ordinary life policy only in that the premium-payment period is of limited duration. This is often desirable from the standpoint of the policyholder since the cost is thus restricted to the more productive years of his life. The net single premium in this case would be replaced by an annuity extending over only n years, say. Denoting this premium by ${}_nP_x$, we have

$${}_nP_x \cdot \text{a}_{x:\overline{n}|} = A_x,$$

or, in terms of commutation symbols,

$$[115] \qquad {}_nP_x = \frac{M_x}{N_x - N_{x+n}}.$$

It should be noted that in the notation for the annual premium, when the premium payment is different from the duration of the policy, the right-hand subscripts indicate the type of policy, while the left-hand subscripts indicate the premium-paying period.

EXERCISES

1. *a.* Find both the net single premium and the net annual premium for a whole life insurance of $1,000 issued to a person aged 28.

b. Determine the net annual premium for the insurance in part *a* if the premium payments are limited to a period of 20 years.

Ans. a, $373.32; $17.35. *b,* $26.26.

2. Determine the net annual premium per $1,000 for an ordinary life policy issued to (x) if (*a*) x is 15, (*b*) x is 30, (*c*) x is 45.

3. *a.* State the kind of insurance and the method of paying the premiums indicated by each of the following: ${}_{20}P_{25}$; A_{35}; P_{30}.

b. Find the numerical value of each of the symbols given in *a*.

Ans. b, $24.98; $419.88; $18.28.

4. A is now 26 years of age. He has $2,000 which he wishes to invest in insurance. How much ordinary life insurance may he purchase with this sum as the net single premium?

5. Prove each of the following: (*a*) $P_x = \frac{dA_x}{1 - A_x}$; (*b*) $A_x = \frac{P_x}{P_x + d}$.

83. Endowment insurance. An *endowment insurance,* as its name implies, is a combination of insurance and of a pure endowment. It is, in fact, a combination of an n-year term insurance plus an n-year pure endowment. It pays the beneficiary the face of the policy if (x) dies within the n years, and it makes the payment to (x) if he is still alive at the end of the n years. This latter fact gives basis for interpreting the net single premium, denoted by the symbol $A_{x:\overline{n}|}$, as the sum $A^{1}_{x:\overline{n}|} + A_{x:\overline{n}|}^{\ \ 1}$, that is, the $A^{1}_{x:\overline{n}|}$ providing the benefit payment if n survives x, and the $A_{x:\overline{n}|}^{\ \ 1}$ providing the payment if x survives n.

Denoting by $P_{x:\overline{n}|}$ the net annual premium which must be contributed at the beginning of the year by each of the persons alive at the successive ages x to $x + n$, to provide $1 to the beneficiaries resulting from d_x deaths the first year, d_{x+1} deaths the second year, and so on to d_{x+n-1} deaths the

nth year, plus l_{x+n} dollars to be paid each of the l_{x+n} survivors at the end of n years, we have, on equating the present value of the contributions to the present value of the benefits,

$$(l_x + v \cdot l_{x+1} + \cdots + v^{n-1} \cdot l_{x+n-1}) \cdot P_{x:\overline{n|}} = v \cdot d_x + v^2 \cdot d_{x+1} + \cdots + v^n \cdot d_{x+n-1} + v^n \cdot l_{x+n}.$$

After reducing to commutation symbols and solving for $P_{x:\overline{n|}}$, the result is found to be

$$[116] \qquad P_{x:\overline{n|}} = \frac{M_x - M_{x+n} + D_{x+n}}{N_x - N_{x+n}}.$$

The net single premium for an n-year endowment insurance will evidently be

$$[117] \qquad A_{x:\overline{n|}} = \frac{M_x - M_{x+n} + D_{x+n}}{D_x}.$$

EXERCISES

1. From first principles carry out the detailed steps for the development of formula [117].

2. Calculate the net annual premium on a $1000, 30-year endowment insurance issued to an individual aged 35.

3. *a.* Determine the net single premium per $1000 for an endowment insurance issued to an individual aged 25 and maturing at age 65, i.e., a 40-year endowment insurance.

b. What part of this premium is necessary to furnish the insurance protection, and what part furnishes the pure endowment?

Ans. $11.39; $8.29.

4. If the payments of net annual premiums on an m-year endowment insurance are limited to a period of n years, show that ${}_nP_{x:\overline{m|}}$, the symbol for this annual premium, may be expressed as

$${}_nP_{x:\overline{m|}} = \frac{M_x - M_{x+m} + D_{x+m}}{N_x - N_{x+n}}.$$

5. Use the formula given in Ex. 4 to find the net annual premium on each $1000 face for a 20-payment 30-year endowment insurance issued to an individual aged 25. *Ans.* $33.15.

6. How much endowment insurance maturing at age 65 may be bought by an individual, aged 30, by making a cash payment of $5,000?

7. A father wishes his 15-year-old son to have a $10,000 endowment-insurance policy which will mature at age 65. Find the respective sizes for the premiums of such a policy when determined on each of the following bases: (*a*) net single premium; (*b*) net annual premium paid over a period of 50 years; (*c*) the annual premium if payments are limited to a period of 20 years. *Ans.* (*a*) $3,417.15, (*b*) $15.11, (*c*) $238.29.

8. Compare the answer in part (*b*) of Ex. 7 with the annual premium of an ordinary life policy issued to an individual aged 15.

84. Other insurance forms. In modern insurance practice a great many different forms of insurance contracts are devised to meet the needs of those who require insurance protection. The methods of making the premium payments are varied greatly to suit the convenience of the buyers. Premiums made payable quarterly, monthly, or at other periodic intervals are used to appeal to those who wish to distribute the cost throughout the year. The more complicated forms of insurance contracts cannot be developed in so brief a treatment as presented here, but many forms differing from those which we have discussed may be readily evaluated by observing the simple idea of equating the value of the mutual fund, created by those purchasing the particular form of contract, to the value of the benefits which are to be received. Premiums of many other contract forms may be expressed as combinations of those which have been presented.

Example. What annual premium for the next 5 years will provide the following benefits to an individual now 30 years of age?

$10,000 term insurance for the first 2 years
8,000 term insurance for the second 2 years
6,000 term insurance for the third 2 years
4,000 term insurance for the fourth 2 years
2,000 term insurance for the fifth 2 years
1,200 at age 50 and a like amount on each birthday thereafter.

Solution. Denoting the premium by the single letter P, the solution can be expressed in the following form:

$$P = \frac{[\$2000(M_{30} - M_{32}) + 2000(M_{30} - M_{34}) + 2000(M_{30} - M_{36}) + 2000(M_{30} - M_{38}) + 2000(M_{30} - M_{40}) + 1200\,N_{50}]}{N_{30} - N_{35}}$$

$$= \$1{,}884.20.$$

EXERCISES

Find the premiums indicated which will provide the benefits as listed below:

Problem	Benefits of Policy	Age at Issue	Premiums
1.	(*a*) $5,000, 15-year term insurance. (*b*) $10,000 endowment at age 65.	40	15 annual premiums
2.	(*a*) $15,000, 10-year term insurance decreasing $1,000 annually. (*b*) $5,000 endowment at age 60.	35	10 annual premiums
3.	(*a*) $10,000 endowment at age 65. (*b*) Annuity of $3,000 annually, first payment at age 66.	25	20 annual premiums
4.	(*a*) $10,000 ordinary life. (*b*) $7,500 endowment at age 60.	30	20 annual premiums

CHAPTER XII

RESERVES

85. Meaning of reserves. The annual premiums which we have computed thus far are often referred to as *net level premiums*. This name emphasizes the fact that, despite the increased sums made necessary each succeeding year by the ever-increasing number of death claims which must be paid, one continues to pay the same premium each year throughout the premium-paying period of the policy.

As an illustration, consider the annual net level premiums on an ordinary life policy for a person aged 25, and the successive natural premiums beginning at age 25. These are exhibited in the accompanying table. A comparison of these premiums shows that each year from age 25 to age 53 inclusive (x) pays more than is necessary to meet his share of the death claims among the l_{25} individuals who entered, and thereafter he pays less than his share of these claims. This excess from overpayment in the earlier years, with interest, constitutes the *reserve* on this policy and provides for the deficiency from the premiums paid in the latter years.

x	c_x	P_{25}
25	\$7.75	\$16.11
26	7.81	16.11
27	7.88	16.11
30	8.10	. . .
40	9.42	. . .
50	13.25	. . .
53	15.86	16.11
54	16.89	16.11
60	25.67	16.11
70	60.19	. . .
80	140.26	. . .
90	441.31	. . .
94 (ω)	831.18	16.11

With the exception of the 1-year term policy, every policy in which net level premiums are paid over a period of years, or in which a net single premium is paid, would in a similar way possess a reserve which is credited to the account of the policyholder.

86. Computation of reserves. There are three widely used methods of computing reserves. These methods are usually referred to as (A) the retrospective method, (B) the prospective method, and (C) the use of Fackler's Accumulation Formula. Where extensive tables are to be set up, these various methods serve as a convenient check on one another in numerical computation. A short discussion of each of these methods follows.

A. The retrospective method for finding the *terminal reserve* — that is, the reserve at the end of the year — consists in finding the difference between the value of the benefits which the insured has already received and the value of the premiums which he has paid in. Since the insured has been paying a premium of P, say, for t years, while having received only insurance protection, — that is, term insurance, — this difference, evaluated as of the date of issue, would be $P \cdot \mathbf{a}_{x:\overline{t|}} - A^{1}_{x:\overline{t|}}$. The value of the reserve at t years would be, therefore,

[118] $$t\text{-th terminal reserve} = (P \cdot \mathrm{a}_{x:\overline{t}|} - A^{1}_{x:\overline{t}|}) \cdot \frac{1}{{}_{n}E_x}.$$

In particular, if P be replaced by the premium for the specific policy under consideration, and if we denote the t-th terminal reserves by the respective symbols shown in the left-hand members of the equations below, we have

[119] (a) $${}_{t}V^{1}_{x:\overline{n}|} = (P^{1}_{x:\overline{n}|} \cdot \mathrm{a}_{x:\overline{t}|} - A^{1}_{x:\overline{t}|}) \cdot \frac{1}{{}_{t}E_x}. \quad (\textit{Term insurance})$$

(b) $${}_{t}V_x = (P_x \cdot \mathrm{a}_{x:\overline{t}|} - A^{1}_{x:\overline{t}|}) \cdot \frac{1}{{}_{t}E_x}. \quad (\textit{Ordinary life})$$

(c) $${}_{t}V_{x:\overline{n}|} = (P_{x:\overline{n}|} \cdot \mathrm{a}_{x:\overline{t}|} - A^{1}_{x:\overline{t}|}) \cdot \frac{1}{{}_{t}E_x}. \quad (\textit{Endowment insurance})$$

These formulas may be put into much more convenient form for evaluation. The accumulated value of $\mathrm{a}_{x:\overline{n}|}$, defined by the symbol ${}_{n}u_x$ (formula [107]), has been tabulated. Similarly, the accumulated value of $A^{1}_{x:\overline{n}|}$, known as the *accumulated cost of insurance* and denoted by the symbol ${}_{n}k_x$, i.e.,

$${}_{n}k_x = A^{1}_{x:\overline{n}|} \cdot \frac{1}{{}_{n}E_x},$$

or

[120] $${}_{n}k_x = \frac{M_x - M_{x+n}}{D_{x+n}},$$

has also been tabulated. The above formulas for the terminal reserves may therefore be expressed in the following forms:

[121] (a) $${}_{t}V^{1}_{x:\overline{n}|} = P^{1}_{x:\overline{n}|} \cdot {}_{n}u_x - {}_{n}k_x.$$

(b) $${}_{t}V_x = P_x \cdot {}_{n}u_x - {}_{n}k_x.$$

(c) $${}_{t}V_{x:\overline{n}|} = P_{x:\overline{n}|} \cdot {}_{n}u_x - {}_{n}k_x.$$

Formulas similar to those given by both [119] and [121] are readily written down for the reserve on limited-payment policies and on policies which have been purchased by net single premiums.

EXERCISE

Show that the formulas of [119] and [121] when expressed in terms of commutation symbols take the following forms:

(a) $${}_{t}V^{1}_{x:\overline{n}|} = \frac{M_x \cdot (N_{x+n} - N_{x+t}) + M_{x+n} \cdot (N_{x+t} - N_x) + M_{x+t} \cdot (N_x - N_{x+n})}{(N_x - N_{x+n}) \cdot D_{x+t}}.$$

(b) $${}_{t}V_x = \frac{M_{x+t} \cdot N_x - M_x \cdot N_{x+t}}{N_x \cdot D_{x+t}}.$$

$$(c)\quad {}_tV_{x:\overline{n}|} = \frac{M_x\cdot(N_{x+n}-N_{x+t}) + M_{x+n}\cdot(N_{x+t}-N_x) + M_{x+t}\cdot(N_x-N_{x+n}) + D_{x+n}\cdot(N_x-N_{x+t})}{(N_x-N_{x+n})\cdot D_{x+t}}.$$

B. The prospective method for evaluating the t-th terminal reserve on a policy issued to (x), similar to the prospective method for evaluating the outstanding debt (see Part One, page 75), considers the values involved as pictured on that part of the time scale beyond $x+t$. In general it may be stated that

$$[122]\qquad t\text{-th terminal reserve} = \begin{pmatrix}\text{value of}\\ \text{future benefits}\end{pmatrix} - \begin{pmatrix}\text{value of}\\ \text{future premiums}\end{pmatrix}.$$

The value of the future benefits may always be expressed in terms of the net single premium which will purchase the remaining insurance benefits at the attained age $x+t$. The value of the future premiums is merely the value at $x+t$ of the annuity formed by the remaining premium payments. From these statements we may express the terminal reserves for which formulas were given in the previous paragraph as

$$[123]\qquad (a)\quad {}_tV^1_{x:\overline{n}|} = A^1_{x+t:\overline{n-t}|} - P^1_{x:\overline{n}|}\cdot \mathbf{a}_{x+t:\overline{n-t}|}.$$

$$(b)\quad {}_tV_x = A_{x+t} - P_x\cdot \mathbf{a}_{x+t}.$$

$$(c)\quad {}_tV_{x:\overline{n}|} = A_{x+t:\overline{n-t}|} - P_{x:\overline{n}|}\cdot \mathbf{a}_{x+t:\overline{n-t}|}.$$

Here, again, alternate forms for evaluating these prospective reserves may be had by replacing the net single premium in each case by the corresponding net annual premium. Making these substitutions, we have

$$[124]\qquad (a)\quad {}_tV^1_{x:\overline{n}|} = (P^1_{x+t:\overline{n-t}|} - P^1_{x:\overline{n}|})\cdot \mathbf{a}_{x+t:\overline{n-t}|}.$$

$$(b)\quad {}_tV_x = (P_{x+t} - P_x)\cdot \mathbf{a}_{x+t}.$$

$$(c)\quad {}_tV_{x:\overline{n}|} = (P_{x+t:\overline{n-t}|} - P_{x:\overline{n}|})\cdot \mathbf{a}_{x+t:\overline{n-t}|}.$$

EXERCISE

By expressing in terms of commutation symbols, show the algebraic equality of the expressions for the corresponding reserves as given by the prospective and retrospective methods of evaluation.

C. Fackler's Accumulation Formula is also in reality a retrospective evaluation formula, since it obtains the value of the benefits on one date by the accumulation of the value of the benefits from some previous date.

Of the l_x individuals entering a given type of insurance contract there remain alive t years later l_{x+t} policyholders, each entitled to receive a reserve of, say, ${}_tV$. Each policyholder immediately pays a premium of P dollars at the beginning of the $(t+1)$th year. This sum, known as the *initial reserve*, is accumulated to the end of the year at rate i, and, after deducting death claims of d_{x+t}, there remains a total of $l_{x+t} \cdot ({}_tV + P)(1+i) - d_{x+t}$ belonging to the l_{x+t+1} survivors. We thus have

$$l_{x+t+1} \cdot {}_{t+1}V = l_{x+t} \cdot ({}_tV + P)(1+i) - d_{x+t}.$$

$$\therefore {}_{t+1}V = \frac{({}_tV + P) \cdot l_{x+t} \cdot (1+i)}{l_{x+t+1}} - \frac{d_{x+t}}{l_{x+t+1}}$$

$$= ({}_tV + P) \cdot \frac{D_{x+t}}{D_{x+t+1}} - \frac{C_{x+t}}{D_{x+t+1}},$$

or

[125] $${}_{t+1}V = ({}_tV + P) \cdot u_{x+t} - k_{x+t}.$$

Replacing V and P by the particular notation in which the expressions for the $(t+1)$th terminal reserves for an n-year term, an ordinary life, and an n-year endowment insurance would be written [125] would give respectively:

$$(a)\quad {}_{t+1}V^{1}_{x:\overline{n}|} = ({}_tV_{x:\overline{n}|} + P^{1}_{x:\overline{n}|}) \cdot u_{x+t} - k_{x+t}.$$

$$(b)\quad {}_{t+1}V_x = ({}_tV_x + P_x) \cdot u_{x+t} - k_{x+t}.$$

$$(c)\quad {}_{t+1}V_{x:\overline{n}|} = ({}_tV_{x:\overline{n}|} + P_{x:\overline{n}|}) \cdot u_{x+t} - k_{x+t}.$$

With tables of u_x and k_x and a calculating machine available, Fackler's Accumulation Formula offers a rapid method of computing a table of terminal reserves. Starting with the 0-th reserve as zero, one needs only to determine the premium of the particular policy under consideration to be able to obtain the successive reserves quite rapidly. In formula [125], P may denote a net annual premium, a net single premium, or a limited-payment premium; and accordingly, if no premium is to be paid at the t-th year, the validity of the formula is obviously in no way affected.

EXERCISES

1. By use of Fackler's Accumulation Formula find the successive reserves on \$1,000, 10-year endowment insurance issued to an individual aged 45.

Ans. ${}_{10}V_{45:\overline{10}|} = \$1,000.$

2. Find the 5th reserve on a \$1,000, 10-year term insurance issued to an individual aged 25. *Ans.* \$1.03.

3. Find the indicated terminal reserve for each of the \$1,000 insurance policies as listed below.

Problem	Reserve	Type of Policy	Age at Issue
a.	5th	Ordinary life	35
b.	10th	30-year endowment insurance	25
c.	8th, 20th, 30th	20-pay, 30-year endowment insurance	25
d.	7th, 10th	10-year term	40
e.	1st, 20th, 96th	20-pay life	30

4. *a.* Find the first 5 reserves on an ordinary life policy issued to an individual aged 30, using Fackler's Accumulation Formula.

b. Check the 5th reserve by both the prospective and the retrospective method of valuation.

5. An individual, now aged 30, purchases an annuity which is to furnish him $1,500 annually on and after his 65th birthday. This annuity is purchased by annual premiums for 15 years, the first one paid immediately. Find the difference between the value of the future benefits and the value of the remaining premium payments just after (30) has reached (*a*) age 40; (*b*) age 50; (*c*) age 70.

Ans. (*a*) $3,135.30; (*b*) $6,466.71; (*c*) $10,731.65.

6. Find reserves 1 to 5 inclusive for the policy of the illustrative example of Section 84.

87. Reserve modifications. While the formulas of the preceding Section 86 give a fairly clear idea of the meaning and of the method of calculation of reserves for many insurance policies, it should be added that modern reserve systems vary the sum actually to be set aside as the reserve on many types of policies. In this brief presentation it is not possible to go into a full discussion of these various reserve systems. We include here, as illustration, a brief statement concerning two of these modifications.

Primarily for the purpose of releasing a greater amount of the first year's premium to provide for the initial expense of the policy — agent's fee, medical-examination fee, advertising, tax, etc. — most reserves are evaluated on a *full preliminary term* (designated, F.P.T.) *basis*. This means that, from the standpoint of setting up reserves, the first year is considered as term insurance and hence has a zero reserve at the end of the first year, with subsequent reserves the same as those for a policy of the same form issued at age one year higher and of one year's less duration.

There are further modifications practiced by many companies. A discussion of some of these will be found * under such titles as The New Jersey Standard, The Illinois Standard, The Ohio Standard, etc. Under the Illinois Standard, for instance, policies whose premiums are greater than those on a 20-payment life at the same age are required to have a reserve at t years, $t < 20$, at least as large as that of the 20-payment life (F.P.T.), the reserve to be equal to that of a policy of the particular type under consideration at $t = 20$ or at the end of the premium-paying period if t is less than 20.

Reserves calculated on the basis of these various modifications can, however, be set up in terms of the formulas which we have presented.

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* Menge and Glover, *An Introduction to the Mathematics of Life Insurance.* The Macmillan Company.

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Amount at End of Year at Compound Interest of p Installments Each of $1/p$ Deposited at End of Each pth Part of Year

$$s_{\overline{1}|}^{(p)} = i/j_{(p)}$$

p	$\frac{1}{4}\%$	$\frac{7}{24}\%$	$\frac{1}{3}\%$	$\frac{5}{12}\%$	p
2	1.0006 2461	1.0007 2864	1.0008 3264	1.0010 4058	2
3	1.0008 3287	1.0009 7159	1.0011 1029	1.0013 8761	3
4	1.0009 3701	1.0010 9309	1.0012 4913	1.0015 6115	4
6	1.0010 4116	1.0012 1459	1.0013 8799	1.0017 3471	6
12	1.0011 4532	1.0013 3610	1.0015 2686	1.0019 0829	12
13	1.0011 5333	1.0013 4545	1.0015 3754	1.0019 2164	13
26	1.0012 0140	1.0014 0154	1.0016 0164	1.0020 0176	26
52	1.0012 2544	1.0014 2958	1.0016 3369	1.0020 4183	52
365	1.0012 4606	1.0014 5363	1.0016 6118	1.0020 7618	365
∞	1.0012 4948	1.0014 5763	1.0016 6574	1.0020 8189	∞

p	$\frac{1}{2}\%$	$\frac{7}{12}\%$	$\frac{5}{8}\%$	$\frac{2}{3}\%$	p
2	1.0012 4844	1.0014 5621	1.0015 6007	1.0016 6390	2
3	1.0016 6482	1.0019 4193	1.0020 8045	1.0022 1894	3
4	1.0018 7305	1.0021 8485	1.0023 4071	1.0024 9654	4
6	1.0020 8131	1.0024 2781	1.0026 0101	1.0027 7419	6
12	1.0022 8960	1.0026 7080	1.0028 6136	1.0030 5189	12
13	1.0023 0563	1.0026 8950	1.0028 8139	1.0030 7325	13
26	1.0024 2182	1.0028 0166	1.0030 1762	1.0032 0144	26
52	1.0024 4985	1.0028 5775	1.0030 6166	1.0032 6554	52
365	1.0024 9107	1.0029 0585	1.0031 1319	1.0033 2051	365
∞	1.0024 9792	1.0029 1384	1.0031 2175	1.0033 2964	∞

p	$\frac{3}{4}\%$	$\frac{7}{8}\%$	1%	$1\frac{1}{8}\%$	p
2	1.0018 7150	1.0021 8274	1.0024 9378	1.0028 0463	2
3	1.0024 9585	1.0029 1102	1.0033 2596	1.0037 4068	3
4	1.0028 0812	1.0032 7529	1.0037 4223	1.0042 0892	4
6	1.0031 2046	1.0036 3967	1.0041 5861	1.0046 7730	6
12	1.0034 3286	1.0040 0411	1.0045 7510	1.0051 4583	12
13	1.0034 5690	1.0040 3215	1.0046 0714	1.0051 8188	13
26	1.0036 0111	1.0042 0039	1.0047 9941	1.0053 9818	26
52	1.0036 7322	1.0042 8452	1.0048 9556	1.0055 0634	52
365	1.0037 3506	1.0043 5666	1.0049 7801	1.0055 9910	365
∞	1.0037 4533	1.0043 6865	1.0049 9171	1.0056 1451	∞

p	$1\frac{1}{4}\%$	$1\frac{3}{8}\%$	$1\frac{1}{2}\%$	$1\frac{3}{4}\%$	p
2	1.0031 1529	1.0034 2576	1.0037 3604	1.0043 6176	2
3	1.0041 5516	1.0045 6942	1.0049 8346	1.0058 1084	3
4	1.0046 7537	1.0051 4158	1.0056 0755	1.0065 3878	4
6	1.0051 9575	1.0057 1395	1.0062 3191	1.0072 6707	6
12	1.0057 1632	1.0062 8654	1.0068 5652	1.0079 9571	12
13	1.0057 5637	1.0063 3060	1.0069 0458	1.0080 5177	13
26	1.0059 9669	1.0065 9495	1.0071 9296	1.0083 8820	26
52	1.0061 1687	1.0067 2715	1.0073 3717	1.0085 5644	52
365	1.0062 1994	1.0068 4052	1.0074 6084	1.0087 0073	365
∞	1.0062 3706	1.0068 5935	1.0074 8139	1.0087 2470	∞

Amount at End of Year at Compound Interest of p Installments Each of $1/p$ Deposited at End of Each pth Part of Year

$$s_{\overline{1|}}^{(p)} = i/j_{(p)}$$

p	2%	2¼%	2½%	2¾%	p
2	1.0049 7525	1.0055 9371	1.0062 1142	1.0068 2837	2
3	1.0066 3733	1.0074 6292	1.0082 8761	1.0091 1141	3
4	1.0074 6856	1.0083 9839	1.0093 2677	1.0102 5422	4
6	1.0083 0125	1.0093 3444	1.0103 6665	1.0113 9789	6
12	1.0091 3389	1.0102 7107	1.0114 0725	1.0125 4243	12
13	1.0091 9796	1.0103 4314	1.0114 8732	1.0126 3051	13
26	1.0095 8243	1.0107 7565	1.0119 6786	1.0131 5908	26
52	1.0097 7470	1.0109 9195	1.0122 0819	1.0134 2343	52
365	1.0099 3960	1.0111 7746	1.0124 1431	1.0136 5016	365
∞	1.0099 6700	1.0112 0828	1.0124 4856	1.0136 8783	∞

p	3%	3½%	4%	4½%	p
2	1.0074 4458	1.0086 7475	1.0099 0195	1.0111 2621	2
3	1.0099 3431	1.0115 7748	1.0132 1713	1.0148 5328	3
4	1.0111 8072	1.0130 3094	1.0148 7744	1.0167 2026	4
6	1.0124 2816	1.0144 8578	1.0165 3957	1.0185 8953	6
12	1.0136 7662	1.0159 4203	1.0182 0351	1.0204 6109	12
13	1.0137 7270	1.0160 5410	1.0183 3158	1.0206 0515	13
26	1.0143 4929	1.0167 2674	1.0191 0023	1.0214 6980	26
52	1.0146 3757	1.0170 6316	1.0194 8470	1.0219 6231	52
365	1.0148 8501	1.0173 5172	1.0198 1447	1.0222 7330	365
∞	1.0149 2610	1.0173 9966	1.0198 6927	1.0223 3494	∞

p	5%	5½%	6%	6½%	p
2	1.0123 4754	1.0135 6596	1.0147 8151	1.0159 9419	2
3	1.0164 8597	1.0181 1522	1.0197 4104	1.0213 6348	3
4	1.0185 5942	1.0203 9495	1.0222 2688	1.0240 5523	4
6	1.0206 3570	1.0226 7810	1.0247 1676	1.0267 5172	6
12	1.0227 1479	1.0249 6465	1.0272 1070	1.0294 5294	12
13	1.0228 7484	1.0251 4068	1.0274 0270	1.0296 6093	13
26	1.0238 3548	1.0261 9729	1.0285 5526	1.0309 0941	26
52	1.0243 1602	1.0267 2586	1.0291 3186	1.0315 3404	52
365	1.0247 2822	1.0271 7928	1.0296 2648	1.0320 6987	365
∞	1.0247 9672	1.0272 5462	1.0297 0867	1.0321 5891	∞

p	7%	7½%	8%	8½%	p
2	1.0172 0402	1.0184 1103	1.0196 1524	1.0208 1667	2
3	1.0229 8254	1.0245 9826	1.0262 1065	1.0278 1974	3
4	1.0258 8002	1.0277 0129	1.0295 1904	1.0313 3332	4
6	1.0287 8298	1.0308 1059	1.0328 3456	1.0348 5492	6
12	1.0316 9143	1.0339 2617	1.0361 5721	1.0383 8455	12
13	1.0319 1538	1.0341 6609	1.0364 1309	1.0386 5642	13
26	1.0332 5978	1.0356 0640	1.0379 4927	1.0402 8845	26
52	1.0339 3242	1.0363 2705	1.0387 1794	1.0411 0511	52
365	1.0345 0947	1.0369 4530	1.0393 7739	1.0418 0577	365
∞	1.0346 0535	1.0370 4804	1.0394 8698	1.0419 2221	∞

Amount of 1 at Compound Interest for Fractional Periods

$$(1+i)^{1/p}$$

p	¼%	7/24%	⅓%	5/12%	p
2	1.0012 4922	1.0014 5727	1.0016 6528	1.0020 8117	2
3	1.0008 3264	1.0009 7128	1.0011 0988	1.0013 8696	3
4	1.0006 2441	1.0007 2837	1.0008 3229	1.0010 4004	4
6	1.0004 1623	1.0004 8552	1.0005 5479	1.0006 9324	6
12	1.0002 0890	1.0002 4273	1.0002 7735	1.0003 4656	12
13	1.0001 9209	1.0002 2406	1.0002 5602	1.0003 1990	13
26	1.0000 9604	1.0001 1202	1.0001 2800	1.0001 5994	26
52	1.0000 4802	1.0000 5601	1.0000 6400	1.0000 7996	52
365	1.0000 0684	1.0000 0798	1.0000 0912	1.0000 1139	365
∞	1.0000 0000	1.0000 0000	1.0000 0000	1.0000 0000	∞

p	½%	7/12%	⅝%	⅔%	p
2	1.0024 9688	1.0029 1243	1.0031 2013	1.0033 2780	2
3	1.0016 6390	1.0019 4068	1.0020 7901	1.0022 1730	3
4	1.0012 4766	1.0014 5515	1.0015 5885	1.0016 6252	4
6	1.0008 3160	1.0009 6987	1.0010 3896	1.0011 0804	6
12	1.0004 1571	1.0004 8482	1.0005 1935	1.0005 5387	12
13	1.0003 8373	1.0004 4751	1.0004 7939	1.0005 1125	13
26	1.0001 9185	1.0002 2373	1.0002 3967	1.0002 5559	26
52	1.0000 9592	1.0001 1186	1.0001 1983	1.0001 2779	52
365	1.0000 1366	1.0000 1594	1.0000 1707	1.0000 1820	365
∞	1.0000 0000	1.0000 0000	1.0000 0000	1.0000 0000	∞

p	¾%	⅞%	1%	1⅛%	p
2	1.0037 4299	1.0043 6547	1.0049 8756	1.0056 0927	2
3	1.0024 9378	1.0029 0820	1.0033 2228	1.0037 3602	3
4	1.0018 6975	1.0021 8036	1.0024 9068	1.0028 0081	4
6	1.0012 4611	1.0014 5304	1.0016 5977	1.0018 6627	6
12	1.0006 2286	1.0007 2626	1.0008 2954	1.0009 3270	12
13	1.0005 7494	1.0006 7037	1.0007 6570	1.0008 6092	13
26	1.0002 8743	1.0003 3513	1.0003 8276	1.0004 3037	26
52	1.0001 4370	1.0001 6755	1.0001 9137	1.0002 1516	52
365	1.0000 2047	1.0000 2387	1.0000 2726	1.0000 3065	365
∞	1.0000 0000	1.0000 0000	1.0000 0000	1.0000 0000	∞

p	1¼%	1⅜%	1½%	1¾%	p
2	1.0062 3059	1.0068 5153	1.0074 7208	1.0087 1205	2
3	1.0041 4943	1.0045 6249	1.0049 7521	1.0057 9963	3
4	1.0031 1046	1.0034 1992	1.0037 2909	1.0043 4658	4
6	1.0020 7257	1.0022 7865	1.0024 8452	1.0028 9562	6
12	1.0010 3575	1.0011 3868	1.0012 4149	1.0014 4677	12
13	1.0009 5604	1.0010 5104	1.0011 4594	1.0013 3540	13
26	1.0004 7790	1.0005 2538	1.0005 7280	1.0006 6748	26
52	1.0002 3892	1.0002 6266	1.0002 8636	1.0003 3368	52
365	1.0000 3403	1.0000 3742	1.0000 4079	1.0000 4753	365
∞	1.0000 0000	1.0000 0000	1.0000 0000	1.0000 0000	∞

Amount of 1 at Compound Interest for Fractional Periods

$$(1+i)^{1/p}$$

p	2%	2¼%	2½%	2¾%	p
2	1.0099 5050	1.0111 8742	1.0124 2284	1.0136 5675	2
3	1.0066 2271	1.0074 4444	1.0082 6484	1.0090 8390	3
4	1.0049 6293	1.0055 7815	1.0061 9225	1.0068 0522	4
6	1.0033 0589	1.0037 1532	1.0041 2392	1.0045 3168	6
12	1.0016 5158	1.0018 5594	1.0020 5984	1.0022 6328	12
13	1.0015 2444	1.0017 1305	1.0019 0124	1.0020 8900	13
26	1.0007 6193	1.0008 5616	1.0009 5017	1.0010 4396	26
52	1.0003 8089	1.0004 2799	1.0004 7497	1.0005 2184	52
365	1.0000 5426	1.0000 6096	1.0000 6765	1.0000 7433	365
∞	1.0000 0000	1.0000 0000	1.0000 0000	1.0000 0000	∞

p	3%	3½%	4%	4½%	p
2	1.0148 8916	1.0173 4950	1.0198 0390	1.0222 5242	2
3	1.0099 0163	1.0115 3314	1.0131 5941	1.0147 8046	3
4	1.0074 1707	1.0086 3745	1.0098 5341	1.0110 6499	4
6	1.0049 3862	1.0057 5004	1.0065 5820	1.0073 6312	6
12	1.0024 6627	1.0028 7090	1.0032 7374	1.0036 7481	12
13	1.0022 7634	1.0026 4977	1.0030 2153	1.0033 9165	13
26	1.0011 3752	1.0013 2401	1.0015 0963	1.0016 9439	26
52	1.0005 6860	1.0006 6179	1.0007 5453	1.0008 4684	52
365	1.0000 8099	1.0000 9425	1.0001 0746	1.0001 2060	365
∞	1.0000 0000	1.0000 0000	1.0000 0000	1.0000 0000	∞

p	5%	5½%	6%	6½%	p
2	1.0246 9508	1.0271 3193	1.0295 6302	1.0319 8837	2
3	1.0163 9636	1.0180 0713	1.0196 1282	1.0212 1347	3
4	1.0122 7224	1.0134 7518	1.0146 7385	1.0158 6828	4
6	1.0081 6485	1.0089 6340	1.0097 5880	1.0105 5107	6
12	1.0040 7412	1.0044 7170	1.0048 6755	1.0052 6169	12
13	1.0037 6014	1.0041 2701	1.0044 9228	1.0048 5597	13
26	1.0018 7831	1.0020 6138	1.0022 4363	1.0024 2504	26
52	1.0009 3871	1.0010 3016	1.0011 2118	1.0012 1179	52
365	1.0001 3368	1.0001 4670	1.0001 5965	1.0001 7255	365
∞	1.0000 0000	1.0000 0000	1.0000 0000	1.0000 0000	∞

p	7%	7½%	8%	8½%	p
2	1.0344 0804	1.0368 2207	1.0392 3048	1.0416 3333	2
3	1.0228 0912	1.0243 9981	1.0259 8557	1.0275 6644	3
4	1.0170 5853	1.0182 4460	1.0194 2655	1.0206 0440	4
6	1.0113 4026	1.0121 2638	1.0129 0946	1.0136 8952	6
12	1.0056 5415	1.0060 4492	1.0064 3403	1.0068 2149	12
13	1.0052 1808	1.0055 7863	1.0059 3764	1.0062 9511	13
26	1.0026 0564	1.0027 8544	1.0029 6443	1.0031 4262	26
52	1.0013 0197	1.0013 9175	1.0014 8112	1.0015 7008	52
365	1.0001 8538	1.0001 9816	1.0002 1087	1.0002 2353	365
∞	1.0000 0000	1.0000 0000	1.0000 0000	1.0000 0000	∞

Nominal Rate of Interest *j* with Frequency of Conversion *p* Corresponding to Effective Rate of Interest *i*

$$j_{(p)} = p[(1+i)^{1/p} - 1]$$

p	$\frac{1}{4}\%$	$\frac{7}{24}\%$	$\frac{1}{3}\%$	$\frac{5}{12}\%$	*p*
2	.0024 9844	.0029 1454	.0033 3056	.0041 6234	2
3	.0024 9792	.0029 1384	.0033 2964	.0041 6089	3
4	.0024 9766	.0029 1348	.0033 2917	.0041 6017	4
6	.0024 9740	.0029 1313	.0033 2871	.0041 5945	6
12	.0024 9714	.0029 1277	.0033 2825	.0041 5873	12
13	.0024 9712	.0029 1275	.0033 2822	.0041 5868	13
26	.0024 9700	.0029 1258	.0033 2800	.0041 5834	26
52	.0024 9694	.0029 1250	.0033 2790	.0041 5818	52
365	.0024 9689	.0029 1243	.0033 2781	.0041 5803	365
∞	.0024 9688	.0029 1242	.0033 2779	.0041 5801	∞
p	$\frac{1}{2}\%$	$\frac{7}{12}\%$	$\frac{5}{8}\%$	$\frac{2}{3}\%$	*p*
2	.0049 9377	.0058 2485	.0062 4026	.0066 5559	2
3	.0049 9169	.0058 2203	.0062 3702	.0066 5191	3
4	.0049 9065	.0058 2062	.0062 3540	.0066 5006	4
6	.0049 8962	.0058 1921	.0062 3379	.0066 4822	6
12	.0049 8858	.0058 1780	.0062 3217	.0066 4638	12
13	.0049 8850	.0058 1769	.0062 3204	.0066 4624	13
26	.0049 8802	.0058 1704	.0062 3130	.0066 4539	26
52	.0049 8778	.0058 1671	.0062 3092	.0066 4497	52
365	.0049 8758	.0058 1643	.0062 3060	.0066 4460	365
∞	.0049 8754	.0058 1639	.0062 3055	.0066 4454	∞
p	$\frac{3}{4}\%$	$\frac{7}{8}\%$	1%	$1\frac{1}{8}\%$	*p*
2	.0074 8599	.0087 3094	.0099 7512	.0112 1854	2
3	.0074 8133	.0087 2460	.0099 6685	.0112 0807	3
4	.0074 7900	.0087 2143	.0099 6272	.0112 0285	4
6	.0074 7667	.0087 1827	.0099 5859	.0111 9763	6
12	.0074 7434	.0087 1510	.0099 5446	.0111 9241	12
13	.0074 7416	.0087 1486	.0099 5414	.0111 9200	13
26	.0074 7309	.0087 1340	.0099 5224	.0111 8960	26
52	.0074 7255	.0087 1267	.0099 5128	.0111 8839	52
365	.0074 7209	.0087 1204	.0099 5047	.0111 8736	365
∞	.0074 7201	.0087 1194	.0099 5033	.0111 8719	∞
p	$1\frac{1}{4}\%$	$1\frac{3}{8}\%$	$1\frac{1}{2}\%$	$1\frac{3}{4}\%$	*p*
2	.0124 6118	.0137 0306	.0149 4417	.0174 2410	2
3	.0124 4828	.0136 8746	.0149 2562	.0173 9890	3
4	.0124 4183	.0136 7966	.0149 1636	.0173 8631	4
6	.0124 3539	.0136 7188	.0149 0710	.0173 7374	6
12	.0124 2895	.0136 6410	.0148 9785	.0173 6119	12
13	.0124 2846	.0136 6350	.0148 9714	.0173 6022	13
26	.0124 2549	.0136 5991	.0148 9288	.0173 5443	26
52	.0124 2400	.0136 5812	.0148 9074	.0173 5153	52
365	.0124 2273	.0136 5658	.0148 8892	.0173 4905	365
∞	.0124 2252	.0136 5633	.0148 8861	.1073 4864	∞

Nominal Rate of Interest *j* with Frequency of Conversion *p* Corresponding to Effective Rate of Interest *i*

$$j_{(p)} = p[(1+i)^{1/p} - 1]$$

p	2%	2¼%	2½%	2¾%	*p*
2	.0199 0099	.0223 7484	.0248 4567	.0273 1349	2
3	.0198 6813	.0223 3333	.0247 9451	.0272 5170	3
4	.0198 5173	.0223 1261	.0247 6899	.0272 2087	4
6	.0198 3534	.0222 9192	.0247 4349	.0271 9009	6
12	.0198 1898	.0222 7125	.0247 1804	.0271 5936	12
13	.0198 1772	.0222 6966	.0247 1608	.0271 5699	13
26	.0198 1017	.0222 6013	.0247 0434	.0271 4283	26
52	.0198 0640	.0222 5537	.0246 9848	.0271 3575	52
365	.0198 0316	.0222 5129	.0246 9345	.0271 2968	365
∞	.0198 0263	.0222 5061	.0246 9261	.0271 2867	∞

p	3%	3½%	4%	4½%	*p*
2	.0297 7831	.0346 9899	.0396 0781	.0445 0483	2
3	.0297 0490	.0345 9943	.0394 7821	.0443 4138	3
4	.0296 6829	.0345 4978	.0394 1363	.0442 5996	4
6	.0296 3173	.0345 0024	.0393 4918	.0441 7874	6
12	.0295 9524	.0344 5078	.0392 8488	.0440 9771	12
13	.0295 9243	.0344 4698	.0392 7994	.0440 9149	13
26	.0295 7561	.0344 2420	.0392 5031	.0440 5417	26
52	.0295 6721	.0344 1281	.0392 3551	.0440 3552	52
365	.0295 6000	.0344 0305	.0392 2282	.0440 1954	365
∞	.0295 5880	.0344 0143	.0392 2071	.0440 1689	∞

p	5%	5½%	6%	6½%	*p*
2	.0493 9015	.0542 6386	.0591 2603	.0639 7674	2
3	.0491 8907	.0540 2139	.0588 3847	.0636 4042	3
4	.0490 8894	.0539 0070	.0586 9538	.0634 7314	4
6	.0489 8908	.0537 8036	.0585 5277	.0633 0644	6
12	.0488 8949	.0536 6039	.0584 1061	.0631 4033	12
13	.0488 8184	.0536 5117	.0583 9969	.0631 2758	13
26	.0488 3597	.0535 9593	.0583 3425	.0630 5113	26
52	.0488 1306	.0535 6834	.0583 0157	.0630 1295	52
365	.0487 9343	.0535 4469	.0582 7356	.0629 8023	365
∞	.0487 9016	.0535 4077	.0582 6891	.0629 7480	∞

p	7%	7½%	8%	8½%	*p*
2	.0688 1609	.0736 4414	.0784 6097	.0832 6667	2
3	.0684 2737	.0731 9942	.0779 5670	.0826 9933	3
4	.0682 3410	.0729 7840	.0777 0619	.0824 1758	4
6	.0680 4156	.0727 5827	.0774 5674	.0821 3712	6
12	.0678 4974	.0725 3903	.0772 0836	.0818 5792	12
13	.0678 3502	.0725 2220	.0771 8930	.0818 3649	13
26	.0677 4676	.0724 2134	.0770 7506	.0817 0811	26
52	.0677 0268	.0723 7098	.0770 1802	.0816 4401	52
365	.0676 6492	.0723 2783	.0769 6916	.0815 8910	365
∞	.0676 5865	.0723 2066	.0769 6104	.0815 7999	∞

Amount of 1 at Compound Interest

$$(1+i)^n$$

n	$\frac{1}{4}\%$	$\frac{7}{24}\%$	$\frac{1}{3}\%$	$\frac{5}{12}\%$	n
1	1.0025 0000	1.0029 1667	1.0033 3333	1.0041 6667	1
2	1.0050 0625	1.0058 4184	1.0066 7778	1.0083 5069	2
3	1.0075 1877	1.0087 7555	1.0100 3337	1.0125 5216	3
4	1.0100 3756	1.0117 1781	1.0134 0015	1.0167 7112	4
5	1.0125 6266	1.0146 6865	1.0167 7815	1.0210 0767	5
6	1.0150 9406	1.0176 2810	1.0201 6741	1.0252 6187	6
7	1.0176 3180	1.0205 9618	1.0235 6797	1.0295 3379	7
8	1.0201 7588	1.0235 7292	1.0269 7986	1.0338 2352	8
9	1.0227 2632	1.0265 5834	1.0304 0313	1.0381 3111	9
10	1.0252 8313	1.0295 5247	1.0338 3780	1.0424 5666	10
11	1.0278 4634	1.0325 5533	1.0372 8393	1.0468 0023	11
12	1.0304 1596	1.0355 6695	1.0407 4154	1.0511 6190	12
13	1.0329 9200	1.0385 8736	1.0442 1068	1.0555 4174	13
14	1.0355 7448	1.0416 1657	1.0476 9138	1.0599 3983	14
15	1.0381 6341	1.0446 5462	1.0511 8369	1.0643 5625	15
16	1.0407 5882	1.0477 0153	1.0546 8763	1.0687 9106	16
17	1.0433 6072	1.0507 5732	1.0582 0326	1.0732 4436	17
18	1.0459 6912	1.0538 2203	1.0617 3060	1.0777 1621	18
19	1.0485 8404	1.0568 9568	1.0652 6971	1.0822 0670	19
20	1.0512 0550	1.0599 7829	1.0688 2060	1.0867 1589	20
21	1.0538 3352	1.0630 6990	1.0723 8334	1.0912 4387	21
22	1.0564 6810	1.0661 7052	1.0759 5795	1.0957 9072	22
23	1.0591 0927	1.0692 8018	1.0795 4448	1.1003 5652	23
24	1 0617 5704	1.0723 9891	1.0831 4296	1.1049 4134	24
25	1.0644 1144	1.0755 2674	1.0867 5344	1.1095 4526	25
26	1.0670 7247	1.0786 6370	1.0903 7595	1.1141 6836	26
27	1.0697 4015	1.0818 0980	1.0940 1053	1.1188 1073	27
28	1.0724 1450	1.0849 6508	1.0976 5724	1.1234 7244	28
29	1.0750 9553	1.0881 2956	1.1013 1609	1.1281 5358	29
30	1.0777 8327	1.0913 0327	1.1049 8715	1.1328 5422	30
31	1.0804 7773	1.0944 8624	1.1086 7044	1.1375 7444	31
32	1,0831 7892	1.0976 7849	1.1123 6601	1.1423 1434	32
33	1.0858 8687	1.1008 8005	1.1160 7389	1.1470 7398	33
34	1.0886 0159	1.1040 9095	1.1197 9414	1.1518 5346	34
35	1.0913 2309	1.1073 1122	1.1235 2679	1.1566 5284	35
36	1.0940 5140	1.1105 4088	1.1272 7187	1.1614 7223	36
37	1.0967 8653	1.1137 7995	1.1310 2945	1.1663 1170	37
38	1.0995 2850	1.1170 2848	1.1347 9955	1.1711 7133	38
39	1.1022 7732	1.1202 8648	1.1385 8221	1.1760 5121	39
40	1.1050 3301	1.1235 5398	1.1423 7748	1.1809 5142	40
41	1.1077 9559	1.1268 3101	1.1461 8541	1.1858 7206	41
42	1.1105 6508	1.1301 1760	1.1500 0603	1.1908 1319	42
43	1.1133 4149	1.1334 1378	1.1538 3938	1.1957 7491	43
44	1.1161 2485	1.1367 1957	1.1576 8551	1.2007 5731	44
45	1.1189 1516	1.1400 3500	1.1615 4446	1.2057 6046	45
46	1.1217 1245	1.1433 6010	1.1654 1628	1.2107 8446	46
47	1.1245 1673	1.1466 9490	1.1693 0100	1.2158 2940	47
48	1.1273 2802	1.1500 3943	1.1731 9867	1.2208 9536	48
49	1.1301 4634	1.1533 9371	1.1771 0933	1.2259 8242	49
50	1.1329 7171	1.1567 5778	1.1810 3303	1.2310 9068	50

Amount of 1 at Compound Interest

$(1+i)^n$

n	$\frac{1}{4}\%$	$\frac{7}{24}\%$	$\frac{1}{3}\%$	$\frac{5}{12}\%$	n
51	1.1358 0414	1.1601 3165	1.1849 6981	1.2362 2002	51
52	1.1386 4365	1.1635 1537	1.1889 1971	1.2413 7114	52
53	1.1414 9026	1.1669 0896	1.1928 8277	1.2465 4352	53
54	1.1443 4398	1.1703 1244	1.1968 5905	1.2517 3745	54
55	1.1472 0484	1.1737 2585	1.2008 4858	1.2569 5302	55
56	1.1500 7285	1.1771 4922	1.2048 5141	1.2621 9033	56
57	1.1529 4804	1.1805 8257	1.2088 6758	1.2674 4946	57
58	1.1558 3041	1.1840 2594	1.2128 9714	1.2727 3050	58
59	1.1587 1998	1.1874 7935	1.2169 4013	1.2780 3354	59
60	1.1616 1678	1.1909 4283	1.2209 9659	1.2833 5868	60
61	1.1645 2082	1.1944 1641	1.2250 6658	1.2887 0601	61
62	1.1674 3213	1.1979 0013	1.2291 5014	1.2940 7561	62
63	1.1703 5071	1.2013 9400	1.2332 4730	1.2994 6760	63
64	1.1732 7658	1.2048 9807	1.2373 5813	1.3048 8204	64
65	1.1762 0977	1.2084 1235	1.2414 8266	1.3103 1905	65
66	1.1791 5030	1.2119 3689	1.2456 2093	1.3157 7872	66
67	1.1820 9817	1.2154 7171	1,2497 7300	1.3212 6113	67
68	1.1850 5342	1.2190 1683	1.2539 3891	1.3267 6638	68
69	1.1880 1605	1.2225 7230	1.2581 1871	1.3322 9458	69
70	1.1909 8609	1.2261 3813	1.2623 1244	1.3378 4580	70
71	1.1939 6356	1.2297 1437	1.2665 2015	1.3434 2016	71
72	1.1969 4847	1.2333 0104	1.2707 4188	1.3490 1774	72
73	1.1999 4084	1.2368 9816	1.2749 7769	1.3546 3865	73
74	1.2029 4069	1.2405 0578	1.2792 2761	1.3602 8298	74
75	1.2059 4804	1.2441 2393	1.2834 9170	1.3659 5082	75
76	1,2089 6291	1.2477 5262	1.2877 7001	1.3716 4229	76
77	1.2119 8532	1.2513 9190	1.2920 6258	1.3773 5746	77
78	1.2150 1528	1.2550 4179	1.2963 6945	1.3830 9645	78
79	1.2180 5282	1.2587 0233	1.3006 9068	1.3888 5935	79
80	1.2210 9795	1.2623 7355	1.3050 2632	1.3946 4627	80
81	1.2241 5070	1.2660 5547	1.3093 7641	1.4004 5729	81
82	1.2272 1108	1.2697 4813	1.3137 4099	1.4062 9253	82
83	1.2302 7910	1.2734 5156	1.3181 2013	1.4121 5209	83
84	1.2333 5480	1.2771 6580	1.3225 1386	1.4180 3605	84
85	1.2364 3819	1.2808 9086	1.3269 2224	1.4239 4454	85
86	1.2395 2928	1.2846 2680	1.3313 4532	1.4298 7764	86
87	1.2426 2811	1.2883 7362	1.3357 8314	1.4358 3546	87
88	1.2457 3468	1.2921 3138	1.3402 3575	1.4418 1811	88
89	1.2488 4901	1.2959 0010	1.3447 0320	1.4478 2568	89
90	1.2519 7114	1.2996 7980	1.3491 8554	1.4538 5829	90
91	1.2551 0106	1.3034 7054	1.3536 8283	1.4599 1603	91
92	1.2582 3882	1.3072 7233	1.3581 9510	1.4659 9902	92
93	1.2613 8441	1.3110 8520	1.3627 2242	1.4721 0735	93
94	1.2645 3787	1.3149 0920	1.3672 6483	1.4782 4113	94
95	1.2676 9922	1.3187 4435	1.3718 2238	1.4844 0047	95
96	1.2708 6847	1.3225 9069	1.3763 9512	1.4905 8547	96
97	1.2740 4564	1.3264 4825	1.3809 8310	1.4967 9624	97
98	1.2772 3075	1.3303 1706	1.3855 8638	1.5030 3289	98
99	1.2804 2383	1.3341 9715	1.3902 0500	1.5092 9553	99
100	1.2836 2489	1.3380 8856	1.3948 3902	1.5155 8426	100

Amount of 1 at Compound Interest

$(1+i)^n$

n	$\frac{1}{4}\%$	$\frac{7}{24}\%$	$\frac{1}{3}\%$	$\frac{5}{12}\%$	n
101	1.2868 3395	1.3419 9131	1.3994 8848	1.5218 9919	101
102	1.2900 5104	1.3459 0546	1.4041 5344	1.5282 4044	102
103	1.2932 7616	1.3498 3101	1.4088 3395	1.5346 0811	103
104	1.2965 0935	1.3537 6802	1.4135 3007	1.5410 0231	104
105	1.2997 5063	1.3577 1651	1.4182 4183	1.5474 2315	105
106	1.3030 0000	1.3616 7652	1.4229 6931	1.5538 7075	106
107	1.3062 5750	1.3656 4807	1.4277 1254	1.5603 4521	107
108	1.3095 2315	1.3696 3121	1.4324 7158	1.5668 4665	108
109	1.3127 9696	1.3736 2597	1.4372 4649	1.5733 7518	109
110	1.3160 7895	1.3776 3238	1.4420 3731	1.5799 3091	110
111	1.3193 6915	1.3816 5047	1.4468 4410	1.5865 1395	111
112	1.3226 6757	1.3856 8029	1.4516 6691	1.5931 2443	112
113	1.3259 7424	1.3897 2186	1.4565 0580	1.5997 6245	113
114	1.3292 8917	1.3937 7521	1.4613 6082	1.6064 2812	114
115	1.3326 1240	1.3978 4039	1.4662 3202	1.6131 2157	115
116	1.3359 4393	1.4019 1742	1.4711 1946	1.6198 4291	116
117	1.3392 8379	1.4060 0635	1.4760 2320	1.6265 9226	117
118	1.3426 3200	1.4101 0720	1.4809 4327	1.6333 6973	118
119	1.3459 8858	1.4142 2001	1.4858 7979	1.6401 7543	119
120	1.3493 5355	1.4183 4482	1.4908 3268	1.6470 0950	120
121	1,3527 2693	1.4224 8166	1.4958 0212	1.6538 7204	121
122	1.3561 0875	1.4266 3057	1.5007 8813	1.6607 6317	122
123	1.3594 9902	1.4307 9157	1.5057 9076	1.6676 8302	123
124	1.3628 9777	1.4349 6471	1.5108 1006	1.6746 3170	124
125	1.3663 0501	1.4391 5003	1.5158 4609	1.6816 0933	125
126	1.3697 2077	1.4433 4755	1.5208 9892	1.6886 1603	126
127	1.3731 4508	1.4475 5731	1.5259 6858	1.6956 5193	127
128	1.3765 7794	1.4517 7935	1.5310 5514	1.7027 1715	128
129	1.3800 1938	1.4560 1371	1.5361 5866	1.7098 1181	129
130	1.3834 6943	1.4602 6042	1.5412 7919	1.7169 3602	130
131	1.3869 2811	1.4645 1951	1.5464 1678	1.7240 8992	131
132	1.3903 9543	1.4687 9103	1.5515 7151	1.7312 7363	132
133	1.3938 7142	1.4730 7500	1.5567 4341	1.7384 8727	133
134	1.3973 5609	1.4773 7147	1.5619 3256	1.7457 3097	134
135	1.4008 4948	1.4816 8047	1.5671 3900	1.7530 0485	135
136	1.4043 5161	1.4860 0204	1.5723 6279	1.7603 0903	136
137	1.4078 6249	1.4903 3621	1.5776 0400	1.7676 4365	137
138	1.4113 8214	1.4946 8302	1.5828 6268	1.7750 0884	138
139	1.4149 1060	1.4990 4252	1.5881 3889	1.7824 0471	139
140	1.4184 4787	1.5034 1472	1.5934 3269	1.7898 3139	140
141	1.4219 9399	1.5077 9968	1.5987 4413	1.7972 8902	141
142	1.4255 4898	1.5121 9743	1.6040 7328	1.8047 7773	142
143	1.4291 1285	1.5166 0801	1.6094 2019	1.8122 9763	143
144	1.4326 8563	1.5210 3145	1.6147 8492	1.8198 4887	144
145	1.4362 6735	1.5254 6779	1.6201 6754	1.8274 3158	145
146	1.4398 5802	1.5299 1707	1.6255 6810	1.8350 4588	146
147	1.4434 5766	1.5343 7933	1.6309 8666	1.8426 9190	147
148	1.4470 6631	1.5388 5460	1.6364 2328	1.8503 6978	148
149	1.4506 8397	1.5433 4293	1.6418 7802	1.8580 7966	149
150	1.4543 1068	1.5478 4434	1.6473 5095	1.8658 2166	150

Amount of 1 at Compound Interest

$(1+i)^n$

n	$\frac{1}{4}\%$	$\frac{7}{24}\%$	$\frac{1}{3}\%$	$\frac{5}{12}\%$	n
151	1.4579 4646	1.5523 5889	1.6528 4212	1.8735 9591	151
152	1.4615 9132	1.5568 8660	1.6583 5160	1.8814 0256	152
153	1.4652 4530	1.5614 2752	1.6638 7943	1.8892 4174	153
154	1.4689 0842	1.5659 8169	1.6694 2570	1.8971 1358	154
155	1.4725 8069	1.5705 4913	1.6749 9045	1.9050 1822	155
156	1.4762 6214	1.5751 2990	1.6805 7375	1.9129 5580	156
157	1.4799 5279	1.5797 2403	1.6861 7566	1.9209 2645	157
158	1.4836 5268	1.5843 3156	1.6917 9625	1.9289 3031	158
159	1.4873 6181	1.5889 5253	1.6974 3557	1.9369 6752	159
160	1.4910 8021	1.5935 8697	1.7030 9369	1.9450 3821	160
161	1.4948 0791	1.5982 3493	1.7087 7067	1.9531 4254	161
162	1.4985 4493	1.6028 9645	1.7144 6657	1.9612 8063	162
163	1.5022 9129	1.6075 7157	1.7201 8146	1.9694 5264	163
164	1.5060 4702	1.6122 6032	1.7259 1540	1.9776 5869	164
165	1.5098 1214	1.6169 6274	1.7316 6845	1.9858 9893	165
166	1.5135 8667	1.6216 7888	1.7374 4068	1.9941 7351	166
167	1.5173 7064	1.6264 0878	1.7432 3215	2.0024 8257	167
168	1.5211 6406	1.6311 5247	1.7490 4292	2.0108 2625	168
169	1.5249 6697	1.6359 1000	1.7548 7306	2.0192 0469	169
170	1.5287 7939	1.6406 8140	1.7607 2264	2.0276 1804	170
171	1.5326 0134	1.6454 6672	1.7665 9172	2.0360 6645	171
172	1.5364 3284	1.6502 6600	1.7724 8035	2.0445 5006	172
173	1.5402 7393	1.6550 7928	1.7783 8862	2.0530 6902	173
174	1.5441 2461	1.6599 0659	1.7843 1658	2.0616 2347	174
175	1.5479 8492	1.6647 4799	1.7902 6431	2.0702 1357	175
176	1.5518 5488	1.6696 0350	1.7962 3185	2.0788 3946	176
177	1.5557 3452	1.6744 7318	1.8022 1929	2.0875 0129	177
178	1.5596 2386	1.6793 5706	1.8082 2669	2.0961 9921	178
179	1.5635 2292	1.6842 5518	1.8142 5411	2.1049 3338	179
180	1.5674 3172	1.6891 6760	1.8203 0163	2.1137 0393	180
181	1.5713 5030	1.6940 9433	1.8263 6930	2.1225 1103	181
182	1.5752 7868	1.6990 3544	1.8324 5720	2.1313 5483	182
183	1.5792 1688	1.7039 9096	1.8385 6539	2.1402 3547	183
184	1.5831 6492	1.7089 6094	1.8446 9394	2.1491 5312	184
185	1.5871 2283	1.7139 4541	1.8508 4292	2.1581 0793	185
186	1.5910 9064	1.7189 4441	1.8570 1240	2.1671 0004	186
187	1.5950 6836	1.7239 5800	1.8632 0244	2.1761 2963	187
188	1.5990 5604	1.7289 8621	1.8694 1311	2.1851 9683	188
189	1.6030 5368	1.7340 2909	1.8756 4449	2.1943 0182	189
190	1.6070 6131	1.7390 8667	1.8818 9664	2.2034 4474	190
191	1.6110 7896	1.7441 5901	1.8881 6963	2.2126 2576	191
192	1.6151 0666	1.7492 4614	1.8944 6352	2.2218 4504	192
193	1.6191 4443	1.7543 4811	1.9007 7840	2.2311 0272	193
194	1.6231 9229	1.7594 6496	1.9071 1433	2.2403 9899	194
195	1.6272 5027	1.7645 9673	1.9134 7138	2.2497 3398	195
196	1.6313 1839	1.7697 4347	1.9198 4962	2.2591 0787	196
197	1.6353 9669	1.7749 0522	1.9262 4912	2.2685 2082	197
198	1.6394 8518	1.7800 8203	1.9326 6995	2.2779 7299	198
199	1.6435 8390	1.7852 7393	1.9391 1218	2.2874 6455	199
200	1.6476 9285	1.7904 8098	1.9455 7589	2.2969 9565	200

Amount of 1 at Compound Interest

$$(1+i)^n$$

n	½%	7/12%	⅝%	⅔%	*n*
1	1.0050 0000	1.0058 3333	1.0062 5000	1.0066 6667	1
2	1.0100 2500	1.0117 0069	1.0125 3906	1.0133 7778	2
3	1.0150 7513	1.0176 0228	1.0188 6743	1.0201 3363	3
4	1.0201 5050	1.0235 3830	1.0252 3535	1.0269 3452	4
5	1.0252 5125	1.0295 0894	1.0316 4307	1.0337 8075	5
6	1.0303 7751	1.0355 1440	1.0380 9084	1.0406 7262	6
7	1.0355 2940	1.0415 5490	1.0445 7891	1.0476 1044	7
8	1.0407 0704	1.0476 3064	1.0511 0753	1.0545 9451	8
9	1.0459 1058	1.0537 4182	1.0576 7695	1.0616 2514	9
10	1.0511 4013	1.0598 8865	1.0642 8743	1.0687 0264	10
11	1.0563 9583	1.0660 7133	1.0709 3923	1.0758 2732	11
12	1.0616 7781	1.0722 9008	1.0776 3260	1.0829 9951	12
13	1.0669 8620	1.0785 4511	1.0843 6780	1.0902 1950	13
14	1.0723 2113	1.0848 3662	1.0911 4510	1.0974 8763	14
15	1.0776 8274	1.0911 6483	1.0979 6476	1.1048 0422	15
16	1.0830 7115	1.0975 2996	1.1048 2704	1.1121 6958	16
17	1.0884 8651	1.1039 3222	1.1117 3221	1.1195 8404	17
18	1.0939 2894	1.1103 7182	1.1186 8053	1.1270 4794	18
19	1.0993 9858	1.1168 4899	1.1256 7229	1.1345 6159	19
20	1.1048 9558	1.1233 6395	1.1327 0774	1.1421 2533	20
21	1.1104 2006	1.1299 1690	1.1397 8716	1.1497 3950	21
22	1.1159 7216	1.1365 0808	1.1469 1083	1.1574 0443	22
23	1.1215 5202	1.1431 3771	1.1540 7902	1.1651 2046	23
24	1.1271 5978	1.1498 0602	1.1612 9202	1.1728 8793	24
25	1.1327 9558	1.1565 1322	1.1685 5009	1.1807 0718	25
26	1.1384 5955	1.1632 5955	1.1758 5353	1.1885 7857	26
27	1.1441 5185	1.1700 4523	1.1832 0262	1.1965 0242	27
28	1.1498 7261	1.1768 7049	1.1905 9763	1.2044 7911	28
29	1.1556 2197	1.1837 3557	1.1980 3887	1.2125 0897	29
30	1.1614 0008	1.1906 4069	1.2055 2661	1.2205 9236	30
31	1.1672 0708	1.1975 8610	1.2130 6115	1.2287 2964	31
32	1.1730 4312	1.2045 7202	1.2206 4278	1.2369 2117	32
33	1.1789 0833	1.2115 9869	1.2282 7180	1.2451 6731	33
34	1.1848 0288	1.2186 6634	1.2359 4850	1.2534 6843	34
35	1.1907 2689	1.2257 7523	1.2436 7318	1.2618 2489	35
36	1.1966 8052	1.2329 2559	1.2514 4614	1.2702 3705	36
37	1.2026 6393	1.2401 1765	1.2592 6767	1.2787 0530	37
38	1.2086 7725	1.2473 5167	1.2671 3810	1.2872 3000	38
39	1.2147 2063	1.2546 2789	1.2750 5771	1.2958 1153	39
40	1.2207 9424	1.2619 4655	1.2830 2682	1.3044 5028	40
41	1.2268 9821	1.2693 0791	1.2910 4574	1.3131 4661	41
42	1.2330 3270	1.2767 1220	1.2991 1477	1.3219 0092	42
43	1.2391 9786	1.2841 5969	1.3072 3424	1.3307 1360	43
44	1.2453 9385	1.2916 5062	1.3154 0446	1.3395 8502	44
45	1.2516 2082	1.2991 8525	1.3236 2573	1.3485 1559	45
46	1.2578 7892	1.3067 6383	1.3318 9839	1.3575 0569	46
47	1.2641 6832	1.3143 8662	1.3402 2276	1.3665 5573	47
48	1.2704 8916	1.3220 5388	1.3485 9915	1.3756 6610	48
49	1.2768 4161	1.3297 6586	1.3570 2790	1.3848 3721	49
50	1.2832 2581	1.3375 2283	1.3655 0932	1.3940 6946	50

Amount of 1 at Compound Interest

$(1+i)^n$

n	$\frac{1}{2}\%$	$\frac{7}{12}\%$	$\frac{5}{8}\%$	$\frac{2}{3}\%$	*n*
51	1.2896 4194	1.3453 2504	1.3740 4375	1.4033 6325	51
52	1.2960 9015	1.3531 7277	1.3826 3153	1.4127 1901	52
53	1.3025 7060	1.3610 6628	1.3912 7297	1.4221 3713	53
54	1.3090 8346	1.3690 0583	1.3999 6843	1.4316 1805	54
55	1.3156 2887	1.3769 9170	1.4087 1823	1.4411 6217	55
56	1.3222 0702	1.3850 2415	1.4175 2272	1.4507 6992	56
57	1.3288 1805	1.3931 0346	1.4263 8224	1.4604 4172	57
58	1.3354 6214	1.4012 2990	1.4352 9713	1.4701 7799	58
59	1.3421 3946	1.4094 0374	1.4442 6773	1.4799 7918	59
60	1.3488 5015	1.4176 2526	1.4532 9441	1.4898 4571	60
61	1.3555 9440	1.4258 9474	1.4623 7750	1.4997 7801	51
62	1.3623 7238	1.4342 1246	1.4715 1736	1.5097 7653	62
63	1.3691 8424	1.4425 7870	1.4807 1434	1.5198 4171	63
64	1.3760 3016	1.4509 9374	1.4899 6881	1.5299 7399	64
65	1.3829 1031	1.4594 5787	1.4992 8111	1.5401 7381	65
66	1.3898 2486	1.4679 7138	1.5086 5162	1.5504 4164	66
67	1.3967 7399	1.4765 3454	1.5180 8069	1.5607 7792	67
68	1.4037 5785	1.4851 4766	1.5275 6869	1.5711 8310	68
69	1.4107 7664	1.4938 1102	1.5371 1600	1.5816 5766	69
70	1.4178 3053	1.5025 2492	1.5467 2297	1.5922 0204	70
71	1.4249 1968	1.5112 8965	1.5563 8999	1.6028 1672	71
72	1.4320 4428	1.5201 0550	1.5661 1743	1.6135 0217	72
73	1.4392 0450	1.5289 7279	1.5759 0566	1.6242 5885	73
74	1.4464 0052	1.5378 9179	1.5857 5507	1.6350 8724	74
75	1.4536 3252	1.5468 6283	1.5956 6604	1.6459 8782	75
76	1.4609 0069	1.5558 8620	1.6056 3896	1.6569 6107	76
77	1.4682 0519	1.5649 6220	1.6156 7420	1.6680 0748	77
78	1.4755 4622	1.5740 9115	1.6257 7216	1.6791 2753	78
79	1.4829 2395	1.5832 7334	1.6359 3324	1.6903 2172	79
80	1.4903 3857	1.5925 0910	1.6461 5782	1.7015 9053	80
81	1.4977 9026	1.6017 9874	1.6564 4631	1.7129 3446	81
82	1.5052 7921	1.6111 4257	1.6667 9910	1.7243 5403	82
83	1.5128 0561	1.6205 4090	1.6772 1659	1.7358 4972	83
84	1.5203 6964	1.6299 9405	1.6876 9920	1.7474 2205	84
85	1.5279 7148	1.6395 0235	1.6982 4732	1.7590 7153	85
86	1.5356 1134	1.6490 6612	1.7088 6136	1.7707 9868	86
87	1.5432 8940	1.6586 8567	1.7195 4175	1.7826 0400	87
88	1.5510 0585	1.6683 6134	1.7302 8888	1.7944 8803	88
89	1.5587 6087	1.6780 9344	1.7411 0319	1.8064 5128	89
90	1.5665 5468	1.6878 8232	1.7519 8508	1.8184 9429	90
91	1.5743 8745	1.6977 2830	1.7629 3499	1.8306 1758	91
92	1.5822 5939	1.7076 3172	1.7739 5333	1.8428 2170	92
93	1.5901 7069	1.7175 9290	1.7850 4054	1.8551 0718	93
94	1.5981 2154	1.7276 1219	1.7961 9704	1.8674 7456	94
95	1.6061 1215	1.7376 8993	1.8074 2328	1.8799 2439	95
96	1.6141 4271	1.7478 2646	1.8187 1967	1.8924 5722	96
97	1.6222 1342	1.7580 2211	1.8300 8667	1.9050 7360	97
98	1.6303 2449	1.7682 7724	1.8415 2471	1.9177 7409	98
99	1.6384 7611	1.7785 9219	1.8530 3424	1.9305 5925	99
100	1.6466 6849	1.7889 6731	1.8646 1570	1.9434 2965	100

Amount of 1 at Compound Interest

$(1+i)^n$

n	½%	$\frac{7}{12}$%	⅝%	⅔%	n
101	1.6549 0183	1.7994 0295	1.8762 6955	1.9563 8585	101
102	1.6631 7634	1.8098 9947	1.8879 9624	1.9694 2842	102
103	1.6714 9223	1.8204 5722	1.8997 9621	1.9825 5794	103
104	1.6798 4969	1.8310 7655	1.9116 6994	1.9957 7499	104
105	1.6882 4894	1.8417 5783	1.9236 1788	2.0090 8016	105
106	1.6966 9018	1.8525 0142	1.9356 4049	2.0224 7403	106
107	1.7051 7363	1.8633 0768	1.9477 3824	2.0359 5719	107
108	1.7136 9950	1.8741 7697	1.9599 1161	2.0495 3024	108
109	1.7222 6800	1.8851 0967	1.9721 6105	2.0631 9377	109
110	1.7308 7934	1.8961 0614	1.9844 8706	2.0769 4840	110
111	1.7395 3373	1.9071 6676	1.9968 9010	2.0907 9472	111
112	1.7482 3140	1.9182 9190	2.0093 7067	2.1047 3335	112
113	1.7569 7256	1.9294 8194	2.0219 2923	2.1187 6491	113
114	1.7657 5742	1.9407 3725	2.0345 6629	2.1328 9000	114
115	1.7745 8621	1.9520 5822	2.0472 8233	2.1471 0927	115
116	1.7834 5914	1.9634 4522	2.0600 7785	2.1614 2333	116
117	1.7923 7644	1.9748 9865	2.0729 5333	2.1758 3282	117
118	1.8013 3832	1.9864 1890	2.0859 0929	2.1903 3837	118
119	1.8103 4501	1.9980 0634	2.0989 4622	2.2049 4063	119
120	1.8193 9673	2.0096 6138	2.1120 6464	2.2196 4023	120
121	1.8284 9372	2.0213 8440	2.1252 6504	2.2344 3784	121
122	1.8376 3619	2.0331 7581	2.1385 4795	2.2493 3409	122
123	1.8468 2437	2.0450 3600	2.1519 1387	2.2643 2965	123
124	1.8560 5849	2.0569 6538	2.1653 6333	2.2794 2518	124
125	1.8653 3878	2.0689 6434	2.1788 9685	2.2946 2135	125
126	1.8746 6548	2.0810 3330	2.1925 1496	2.3099 1882	126
127	1.8840 3880	2.0931 7266	2.2062 1818	2.3253 1828	127
128	1.8934 5900	2.1053 8284	2.2200 0704	2.3408 2040	128
129	1.9029 2629	2.1176 6424	2.2338 8209	2.3564 2587	129
130	1.9124 4092	2.1300 1728	2.2478 4385	2.3721 3538	130
131	1.9220 0313	2.1424 4238	2.2618 9287	2.3879 4962	131
132	1.9316 1314	2.1549 3996	2.2760 2970	2.4038 6928	132
133	1.9412 7121	2.1675 1044	2.2902 5489	2.4198 9507	133
134	1.9509 7757	2.1801 5425	2,3045 6898	2.4360 2771	134
135	1.9607 3245	2.1928 7182	2.3189 7254	2.4522 6789	135
136	1.9705 3612	2.2056 6357	2.3334 6612	2.4686 1635	136
137	1.9803 8880	2.2185 2994	2.3480 5028	2.4850 7379	137
138	1.9902 9074	2.2314 7137	2.3627 2559	2.5016 4095	138
139	2.0002 4219	2.2444 8828	2.3774 9263	2.5183 1855	139
140	2.0102 4340	2.2575 8113	2.3923 5196	2.5351 0734	140
141	2.0202 9462	2.2707 5036	2.4073 0416	2.5520 0806	141
142	2.0303 9609	2.2839 9640	2.4223 4981	2.5690 2145	142
143	2.0405 4808	2.2973 1971	2.4374 8950	2.5861 4826	143
144	2.0507 5082	2.3107 2074	2.4527 2380	2.6033 8924	144
145	2.0610 0457	2.3241 9995	2.4680 5333	2.6207 4517	145
146	2.0713 0959	2.3377 5778	2.4834 7866	2.6382 1681	146
147	2.0816 6614	2.3513 9470	2.4990 0040	2.6558 0492	147
148	2.0920 7447	2.3651 1117	2.5146 1916	2.6735 1028	148
149	2.1025 3484	2.3789 0765	2.5303 3553	2.6913 3369	149
150	2.1130 4752	2.3927 8461	2.5461 5012	2.7092 7591	150

Amount of 1 at Compound Interest

$(1+i)^n$

n	½%	7/12%	5/8%	2/3%	n
151	2.1236 1276	2.4067 4252	2.5620 6356	2.7273 3775	151
152	2.1342 3082	2.4207 8186	2.5780 7646	2.7455 2000	152
153	2.1449 0197	2.4349 0308	2.5941 8944	2.7638 2347	153
154	2.1556 2648	2.4491 0668	2.6104 0312	2.7822 4896	154
155	2.1664 0462	2.4633 9314	2.6267 1814	2.8007 9729	155
156	2.1772 3664	2.4777 6293	2.6431 3513	2.8194 6927	156
157	2.1881 2282	2.4922 1655	2.6596 5472	2.8382 6573	157
158	2.1990 6344	2.5067 5448	2.6762 7756	2.8571 8750	158
159	2.2100 5875	2.5213 7722	2.6930 0430	2.8762 3542	159
160	2.2211 0905	2.5360 8525	2.7098 3558	2.8954 1032	160
161	2.2322 1459	2.5508 7908	2.7267 7205	2.9147 1306	161
162	2.2433 7566	2.5657 5921	2.7438 1437	2.9341 4448	162
163	2.2545 9254	2.5807 2614	2.7609 6321	2.9537 0544	163
164	2.2658 6551	2.5957 8037	2.7782 1923	2.9733 9681	164
165	2.2771 9483	2.6109 2242	2.7955 8310	2.9932 1945	165
166	2.2885 8081	2.6261 5280	2.8130 5550	3.0131 7425	166
167	2.3000 2371	2.6414 7203	2.8306 3710	3.0332 6208	167
168	2.3115 2383	2.6568 8062	2.8483 2858	3.0534 3883	168
169	2.3230 8145	2.6723 7909	2.8661 3063	3.0738 4038	169
170	2.3346 9686	2.6879 6796	2.8840 4395	3.0943 3265	170
171	2.3463 7034	2.7036 4778	2.9020 6922	3.1149 6154	171
172	2.3581 0219	2.7194 1906	2.9202 0715	3.1357 2795	172
173	2.3698 9270	2.7352 8233	2.9384 5845	3.1566 3280	173
174	2.3817 4217	2.7512 3815	2.9568 2381	3.1776 7702	174
175	2.3936 5088	2.7672 8704	2.9753 0396	3.1988 6153	175
176	2.4056 1913	2.7834 2954	2.9938 9961	3.2201 8728	176
177	2.4176 4723	2.7996 6622	3.0126 1149	3.2416 5519	177
178	2.4297 3546	2.8159 9760	3.0314 4031	3.2632 6623	178
179	2.4418 8414	2.8324 2426	3.0503 8681	3.2850 2134	179
180	2.4540 9356	2.8489 4673	3.0694 5173	3.3069 2148	180
181	2.4663 6403	2.8655 6559	3.0886 3580	3.3289 6762	181
182	2.4786 9585	2.8822 8139	3.1079 3977	3.3511 6074	182
183	2.4910 8933	2.8990 9469	3.1272 6440	3.3735 0181	183
184	2.5035 4478	2.9160 0608	3.1469 1043	3.3959 9182	184
185	2.5160 6250	2.9330 1612	3.1665 7862	3.4186 3177	185
186	2.5286 4281	2.9501 2538	3.1863 6973	3.4414 2265	186
187	2.5412 8603	2.6973 3444	3.2062 8454	3.4643 6546	187
188	2.5539 9246	2.9846 4389	3.2263 2382	3.4874 6123	188
189	2.5667 6242	3.0020 5431	3.2464 8834	3.5107 1097	189
190	2.5795 9623	3.0195 6630	3.2667 7890	3.5341 1571	190
191	2.5924 9421	3.0371 8043	3.2871 9627	3.5576 7649	191
192	2.6054 5668	3.0548 9732	3.3077 4124	3.5813 9433	192
193	2.6184 8397	3.0727 1755	3.3284 1462	3.6052 7029	193
194	2.6315 7639	3.0906 4174	3.3492 1722	3.6293 0543	194
195	2.6447 3427	3.1086 7048	3.3701 4982	3.6535 0080	195
196	2.6579 5794	3.1268 0440	3.3912 1326	3.6778 5747	196
197	2.6712 4773	3.1450 4409	3.4124 0834	3.7023 7652	197
198	2.6846 0397	3.1633 9018	3.4337 3589	3.7270 5903	198
199	2.6980 2699	3.1818 4329	3.4551 9674	3.7519 0609	199
200	2.7115 1712	3.2004 0404	3.4767 9172	3.7769 1880	200

Amount of 1 at Compound Interest

$(1+i)^n$

n	¾%	⅞%	1%	1⅛%	*n*
1	1.0075 0000	1.0087 5000	1.0100 0000	1.0112 5000	1
2	1.0150 5625	1 0175 7656	1.0201 0000	1.0226 2656	2
3	1.0226 6917	1.0264 8036	1.0303 0100	1.0341 3111	3
4	1.0303 3919	1.0354 6206	1.0406 0401	1.0457 6509	4
5	1.0380 6673	1.0445 2235	1.0510 1005	1.0575 2994	5
6	1.0458 5224	1.0536 6192	1.0615 2015	1.0694 2716	6
7	1.0536 9613	1.0628 8147	1.0721 3535	1.0814 5821	7
8	1.0615 9885	1.0721 8168	1.0828 5671	1.0936 2462	8
9	1.0695 6084	1.0815 6327	1.0936 8527	1.1059 2789	9
10	1.0775 8255	1.0910 2695	1.1046 2213	1.1183 6958	10
11	1.0856 6441	1.1005 7343	1.1156 6835	1.1309 5124	11
12	1.0938 0690	1.1102 0345	1.1268 2503	1.1436 7444	12
13	1.1020 1045	1.1199 1773	1.1380 9328	1.1565 4078	13
14	1.1102 7553	1.1297 1701	1.1494 7421	1.1695 5186	14
15	1.1186 0259	1.1396 0203	1.1609 6896	1.1827 0932	15
16	1.1269 9211	1.1495 7355	1.1725 7864	1.1960 1480	16
17	1.1354 4455	1.1596 3232	1.1843 0443	1.2094 6997	17
18	1.1439 6039	1.1697 7910	1.1961 4748	1.2230 7650	18
19	1.1525 4009	1.1800 1467	1.2081 0895	1.2368 3611	19
20	1.1611 8414	1.1903 3980	1.2201 9004	1.2507 5052	20
21	1.1698 9302	1.2007 5527	1.2323 9194	1.2648 2146	21
22	1.1786 6722	1.2112 6188	1.2447 1586	1.2790 5071	22
23	1.1875 0723	1.2218 6042	1.2571 6302	1.2934 4003	23
24	1.1964 1353	1.2325 5170	1.2697 3465	1.3079 9123	24
25	1.2053 8663	1.2433 3653	1.2824 3200	1.3227 0613	25
26	1.2144 2703	1.2542 1572	1.2952 5631	1.3375 8657	26
27	1.2235 3523	1.2651 9011	1.3082 0888	1.3526 3442	27
28	1.2327 1175	1.2762 6052	1.3212 9097	1.3678 5156	28
29	1.2419 5709	1.2874 2780	1.3345 0388	1.3832 3989	29
30	1.2512 7176	1.2986 9280	1.3478 4892	1.3988 0134	30
31	1.2606 5630	1.3100 5636	1.3613 2740	1.4145 3785	31
32	1.2701 1122	1.3215 1935	1.3749 4068	1.4304 5140	32
33	1.2796 3706	1.3330 8265	1.3886 9009	1.4465 4398	33
34	1.2892 3434	1.3447 4712	1.4025 7699	1.4628 1760	34
35	1.2989 0359	1.3565 1366	1.4166 0276	1.4792 7430	35
36	1.3086 4537	1.3683 8315	1.4307 6878	1.4959 1613	36
37	1.3184 6021	1.3803 5650	1.4450 7647	1.5127 4519	37
38	1.3283 4866	1.3924 3462	1.4595 2724	1.5297 6357	38
39	1.3383 1128	1.4046 1843	1.4741 2251	1.5469 7341	39
40	1.3483 4861	1.4169 0884	1.4888 6373	1.5643 7687	40
41	1.3584 6123	1.4293 0679	1.5037 5237	1.5819 7611	41
42	1.3686 4969	1.4418 1322	1.5187 8989	1.5997 7334	42
43	1.3789 1456	1.4544 2909	1.5339 7779	1.6177 7079	43
44	1.3892 5642	1.4671 5534	1.5493 1757	1.6359 7071	44
45	1.3996 7584	1.4799 9295	1.5648 1075	1.6543 7538	45
46	1.4101 7341	1.4929 4289	1.5804 5885	1.6729 8710	46
47	1.4207 4971	1.5060 0614	1.5962 6344	1.6918 0821	47
48	1.4314 0533	1.5191 8370	1.6122 2608	1.7108 4105	48
49	1.4421 4087	1.5324 7655	1.6283 4834	1.7300 8801	49
50	1.4529 5693	1.5458 8572	1.6446 3182	1.7495 5150	50

Amount of 1 at Compound Interest*

$(1+i)^n$

n	¾%	⅞%	1%	1⅛%	n
51	1.4638 5411	1.5594 1222	1.6610 7814	1.7692 3395	51
52	1.4748 3301	1.5730 5708	1.6776 8892	1.7891 3784	52
53	1.4858 9426	1.5868 2133	1.6944 6581	1.8092 6564	53
54	1.4970 3847	1.6007 0602	1.7114 1047	1.8296 1988	54
55	1.5082 6626	1.6147 1219	1.7285 2457	1.8502 0310	55
56	1.5195 7825	1.6288 4093	1.7458 0982	1.8710 1788	56
57	1.5309 7509	1.6430 9328	1.7632 6792	1.8920 6684	57
58	1.5424 5740	1.6574 7035	1.7809 0060	1.9133 5259	58
59	1.5540 2583	1.6719 7322	1.7987 0960	1.9348 7780	59
60	1.5656 8103	1.6866 0298	1.8166 9670	1.9566 4518	60
61	1.5774 2363	1.7013 6076	1.8348 6367	1.9786 5744	61
62	1.5892 5431	1.7162 4766	1.8532 1230	2.0009 1733	62
63	1.6011 7372	1.7312 6483	1.8717 4443	2.0234 2765	63
64	1.6131 8252	1.7464 1340	1.8904 6187	2.0461 9121	64
65	1.6252 8139	1.7616 9452	1.9093 6649	2.0692 1087	65
66	1.6374 7100	1.7771 0934	1.9284 6015	2.0924 8949	66
67	1.6497 5203	1.7926 5905	1.9477 4475	2.1160 2999	67
68	1.6621 2517	1.8083 4482	1.9672 2220	2.1398 3533	68
69	1.6745 9111	1.8241 6783	1.9868 9442	2.1639 0848	69
70	1.6871 5055	1.8401 2930	2.0067 6337	2.1882 5245	70
71	1.6998 0418	1.8562 3043	2.0268 3100	2.2128 7029	71
72	1.7125 5271	1.8724 7245	2.0470 9931	2.2377 6508	72
73	1.7253 9685	1.8888 5658	2.0675 7031	2.2629 3994	73
74	1.7383 3733	1.9053 8408	2.0882 4601	2.2883 9801	74
75	1.7513 7486	1.9220 5619	2.1091 2847	2.3141 4249	75
76	1.7645 1017	1.9388 7418	2.1302 1975	2.3401 7659	76
77	1.7777 4400	1.9558 3933	2.1515 2195	2.3665 0358	77
78	1.7910 7708	1.9729 5292	2.1730 3717	2.3931 2675	78
79	1.8045 1015	1.9902 1626	2.1947 6754	2.4200 4942	79
80	1.8180 4398	2.0076 3066	2.2167 1522	2.4472 7498	80
81	1.8316 7931	2.0251 9742	2.2388 8237	2.4748 0682	81
82	1.8454 1691	2.0429 1790	2.2612 7119	2.5026 4840	82
83	1.8592 5753	2.0607 9343	2.2838 8390	2.5308 0319	83
84	1.8732 0196	2.0788 2537	2.3067 2274	2.5592 7473	84
85	1.8872 5098	2.0970 1510	2.3297 8997	2.5880 6657	85
86	1.9014 0536	2.1153 6398	2.3530 8787	2.6171 8232	86
87	1.9156 6590	2.1338 7341	2.3766 1875	2.6466 2562	87
88	1.9300 3339	2.1525 4481	2.4003 8494	2.6764 0016	88
89	1.9445 0865	2.1713 7957	2.4243 8879	2.7065 0966	89
90	1.9590 9246	2.1903 7914	2.4486 3267	2.7369 5789	90
91	1.9737 8565	2.2095 4496	2.4731 1900	2.7677 4867	91
92	1.9885 8905	2.2288 7848	2.4978 5019	2.7988 8584	92
93	2.0035 0346	2.2483 8117	2.5228 2869	2.8303 7331	93
94	2.0185 2974	2.2680 5450	2.5480 5698	2.8622 1501	94
95	2.0336 6871	2.2878 9998	2.5735 3755	2.8944 1492	95
96	2.0489 2123	2.3079 1910	2.5992 7293	2.9269 7709	96
97	2.0642 8814	2.3281 1340	2.6252 6565	2.9599 0559	97
98	2.0797 7030	2.3484 8439	2.6515 1831	2.9932 0452	98
99	2.0953 6858	2.3690 3363	2.6780 3349	3.0268 7807	99
100	2.1110 8384	2.3897 6267	2.7048 1383	3.0609 3045	100

Amount of 1 at Compound Interest

$$(1+i)^n$$

n	¾%	⅞%	1%	1⅛%	*n*
101	2.1269 1697	2.4106 7309	2.7318 6197	3.0953 6592	101
102	2.1428 6885	2.4317 6648	2.7591 8059	3.1301 8879	102
103	2.1589 4036	2.4530 4444	2.7867 7239	3.1654 0341	103
104	2.1751 3242	2.4745 0858	2.8146 4012	3.2010 1420	104
105	2.1914 4591	2 4961 6053	2.8427 8652	3.2370 2561	105
106	2.2078 8175	2.5180 0193	2.8712 1438	3.2734 4215	106
107	2.2244 4087	2.5400 3445	2.8999 2653	3.3102 6837	107
108	2.2411 2417	2.5622 5975	2.9289 2579	3.3475 0889	108
109	2.2579 3260	2.5846 7953	2.9582 1505	3.3851 6836	109
110	2.2748 6710	2.6072 9547	2.9877 9720	3.4232 5151	110
111	2.2919 2860	2.6301 0931	3.0176 7517	3.4617 6309	111
112	2.3091 1807	2.6531 2276	3.0478 5192	3.5007 0792	112
113	2.3264 3645	2.6763 3759	3.0783 3044	3.5400 9089	113
114	2.3438 8472	2.6997 5554	3.1091 1375	3.5799 1691	114
115	2.3614 6386	2.7233 7840	3.1402 0489	3.6201 9097	115
116	2.3791 7484	2.7472 0796	3.1716 0693	3.6609 1812	116
117	2.3970 1865	2.7712 4603	3.2033 2300	3.7021 0345	117
118	2.4149 9629	2.7954 9444	3.2353 5623	3.7437 5212	118
119	2.4331 0876	2.8199 5501	3.2677 0980	3.7858 6933	119
120	2.4513 5708	2.8446 2962	3.3003 8689	3.8284 6036	120
121	2.4697 4226	2.8695 2013	3.3333 9076	3.8715 3054	121
122	2.4882 6532	2.8946 2843	3.3667 2467	3.9150 8525	122
123	2.5069 2731	2.9199 5643	3.4003 9192	3.9591 2996	123
124	2.5257 2927	2.9455 0605	3.4343 9584	4.0036 7018	124
125	2.5446 7224	2.9712 7922	3.4687 3980	4.0487 1147	125
126	2.5637 5728	2.9972 7792	3.5034 2719	4.0942 5947	126
127	2.5829 8546	3.0235 0410	3.5384 6147	4.1403 1989	127
128	2.6023 5785	3.0499 5976	3.5738 4608	4.1868 9849	128
129	2.6218 7553	3.0766 4691	3.6095 8454	4.2340 0110	129
130	2.6415 3960	3.1035 6757	3.6456 8039	4.2816 3361	130
131	2.6613 5115	3.1307 2378	3.6821 3719	4.3298 0199	131
132	2.6813 1128	3.1581 1762	3.7189 5856	4.3785 1226	132
133	2.7014 2112	3.1857 5115	3.7561 4815	4.4277 7052	133
134	2.7216 8177	3.2136 2647	3.7937 0963	4.4775 8294	134
135	2.7420 9439	3.2417 4570	3.8316 4673	4.5279 5575	135
136	2.7626 6009	3.2701 1098	3.8699 6319	4.5788 9525	136
137	2.7833 8005	3.2987 2445	3.9086 6282	4.6304 0782	137
138	2.8042 5540	3.3275 8829	3.9477 4945	4.6824 9991	138
139	2.8252 8731	3.3567 0468	3.9872 2695	4.7351 7803	139
140	2.8464 7697	3.3860 7585	4.0270 9922	4.7884 4879	140
141	2.8678 2554	3.4157 0401	4.0673 7021	4.8423 1883	141
142	2.8893 3424	3.4455 9142	4.1080 4391	4.8967 9492	142
143	2.9110 0424	3.4757 4035	4.1491 2435	4.9518 8386	143
144	2.9328 3677	3.5061 5308	4.1906 1559	5.0075 9256	144
145	2.9548 3305	3.5368 3192	4.2325 2175	5.0639 2797	145
146	2.9769 9430	3.5677 7919	4.2748 4697	5.1208 9716	146
147	2.9993 2175	3.5989 9726	4.3175 9544	5.1785 0726	147
148	3.0218 1667	3.6304 8849	4.3607 7139	5.2367 6546	148
149	3.0444 8029	3.6622 5526	4.4043 7910	5.2956 7908	149
150	3.0673 1389	3.6943 0000	4.4484 2290	5.3552 5546	150

Amount of 1 at Compound Interest

$(1+i)^n$

n	$\frac{3}{4}\%$	$\frac{7}{8}\%$	1%	$1\frac{1}{8}\%$	n
151	3.0903 1875	3.7266 2512	4.4929 0712	5.4155 0209	151
152	3.1134 9614	3.7592 3309	4.5378 3620	5.4764 2649	152
153	3.1368 4736	3.7921 2638	4.5832 1456	5.5380 3629	153
154	3.1603 7372	3.8253 0749	4.6290 4670	5.6003 3919	154
155	3.1840 7652	3.8587 7893	4.6753 3717	5.6633 4301	155
156	3.2079 5709	3.8925 4324	4.7220 9054	5.7270 5562	156
157	3.2320 1677	3.9266 0300	4.7693 1145	5.7914 8499	157
158	3.2562 5690	3.9609 6077	4.8170 0456	5.8566 3920	158
159	3.2806 7882	3.9956 1918	4.8651 7461	5.9225 2639	159
160	3.3052 8391	4.0305 8085	4.9138 2635	5.9891 5481	160
161	3.3300 7354	4.0658 4843	4.9629 6462	6.0565 3280	161
162	3.3550 4910	4.1014 2460	5.0125 9426	6.1246 6880	162
163	3.3802 1196	4.1373 1207	5.0627 2021	6.1935 7132	163
164	3.4055 6355	4.1735 1355	5.1133 4741	6.2632 4900	164
165	3.4311 0528	4.2100 3179	5.1644 8088	6.3337 1055	165
166	3.4568 3857	4.2468 6957	5.2161 2569	6.4049 6479	166
167	3.4827 6486	4.2840 2968	5.2682 8695	6.4770 2065	167
168	3.5088 8560	4.3215 1494	5.3209 6982	6.5498 8713	168
169	3.5352 0224	4.3593 2819	5.3741 7952	6.6235 7336	169
170	3.5617 1625	4.3974 7232	5.4279 2131	6.6980 8856	170
171	3.5884 2913	4.4359 5020	5.4822 0052	6.7734 4206	171
172	3.6153 4234	4.4747 6476	5.5370 2253	6.8496 4328	172
173	3.6424 5741	4.5139 1896	5.5923 9275	6.9267 0177	173
174	3.6697 7584	4.5534 1575	5.6483 1668	7.0046 2716	174
175	3.6972 9916	4.5932 5813	5.7047 9985	7.0834 2922	175
176	3.7250 2891	4.6334 4914	5.7618 4785	7.1631 1780	176
177	3.7529 6662	4.6739 9182	5.8194 6633	7.2437 0287	177
178	3.7811 1387	4.7148 8925	5.8776 6099	7.3251 9453	178
179	3.8094 7223	4.7561 4453	5.9364 3760	7.4076 0297	179
180	3.8380 4327	4.7977 6080	5.9958 0198	7.4909 3850	180
181	3.8668 2859	4.8397 4120	6.0557 6000	7.5752 1156	181
182	3.8958 2981	4.8820 8894	6.1163 1760	7.6604 3269	182
183	3.9250 4853	4.9248 0722	6.1774 8077	7.7466 1256	183
184	3.9544 8639	4.9678 9928	6.2392 5558	7.8337 6195	184
185	3.9841 4504	5.0113 6840	6.3016 4813	7.9218 9177	185
186	4.0140 2613	5.0552 1787	6.3646 6462	8.0110 1305	186
187	4.0441 3133	5.0994 5103	6.4283 1126	8.1011 3695	187
188	4.0744 6231	5.1440 7123	6.4925 9437	8.1922 7474	188
189	4.1050 2078	5.1890 8185	6.5575 2032	8.2844 3783	189
190	4.1358 0843	5.2344 8631	6.6230 9552	8.3776 3776	190
191	4.1668 2700	5.2802 8807	6.6893 2648	8.4718 8618	191
192	4.1980 7820	5.3264 9059	6.7562 1974	8.5671 9490	192
193	4.2295 6379	5.3730 9738	6.8237 8194	8.6635 7584	193
194	4.2612 8551	5.4201 1199	6.8920 1976	8.7610 4107	194
195	4.2932 4516	5.4675 3797	6.9609 3996	8.8596 0278	195
196	4.3254 4449	5.5153 7892	7.0305 4936	8.9592 7332	196
197	4.3578 8533	5.5636 3849	7.1008 5485	9.0600 6514	197
198	4.3905 6947	5.6123 2033	7.1718 6340	9.1619 9087	198
199	4.4234 9874	5.6614 2813	7.2435 8203	9.2650 6327	199
200	4.4566 7498	5.7109 6562	7.3160 1785	9.3692 9523	200

Amount of 1 at Compound Interest

$$(1+i)^n$$

n	1 ¼%	1 ⅜%	1 ½%	1 ¾%	*n*
1	1.0125 0000	1.0137 5000	1.0150 0000	1.0175 0000	1
2	1.0251 5625	1.0276 8906	1.0302 2500	1.0353 0625	2
3	1.0379 7070	1.0418 1979	1.0456 7838	1.0534 2411	3
4	1.0509 4534	1.0561 4481	1.0613 6355	1.0718 5903	4
5	1.0640 8215	1.0706 6680	1.0772 8400	1.0906 1656	5
6	1.0773 8318	1.0853 8847	1.0934 4326	1.1097 0235	6
7	1.0908 5047	1.1003 1256	1.1098 4491	1.1291 2215	7
8	1.1044 8610	1.1154 4186	1.1264 9259	1.1488 8178	8
9	1.1182 9218	1.1307 7918	1.1433 8998	1.1689 8721	9
10	1.1322 7083	1.1463 2740	1.1605 4083	1.1894 4449	10
11	1.1464 2422	1.1620 8940	1.1779 4894	1.2102 5977	11
12	1.1607 5452	1.1780 6813	1.1956 1817	1.2314 3931	12
13	1.1752 6395	1.1942 6656	1.2135 5244	1.2529 8950	13
14	1.1899 5475	1.2106 8773	1.2317 5573	1.2749 1682	14
15	1.2048 2918	1.2273 3469	1.2502 3207	1.2972 2786	15
16	1.2198 8955	1.2442 1054	1.2689 8555	1.3199 2935	16
17	1.2351 3817	1.2613 1843	1.2880 2033	1.3430 2811	17
18	1.2505 7739	1.2786 6156	1.3073 4064	1.3665 3111	18
19	1.2662 0961	1.2962 4316	1.3269 5075	1.3904 4540	19
20	1.2820 3723	1.3140 6650	1.3468 5501	1.4147 7820	20
21	1.2980 6270	1.3321 3492	1.3670 5783	1.4395 3681	21
22	1.3142 8848	1.3504 5177	1.3875 6370	1.4647 2871	22
23	1.3307 1709	1.3690 2048	1.4083 7715	1.4903 6146	23
24	1.3473 5105	1.3878 4451	1.4295 0281	1.5164 4279	24
25	1.3641 9294	1.4069 2738	1.4509 4535	1.5429 8054	25
26	1.3812 4535	1.4262 7263	1.4727 0953	1.5699 8269	26
27	1.3985 1092	1.4458 8388	1.4948 0018	1.5974 5739	27
28	1.4159 9230	1.4657 6478	1.5172 2218	1.6254 1290	28
29	1.4336 9221	1.4859 1905	1.5399 8051	1.6538 5762	29
30	1.4516 1336	1.5063 5043	1.5630 8022	1.6828 0013	30
31	1.4697 5853	1.5270 6275	1.5865 2642	1.7122 4913	31
32	1.4881 3051	1.5480 5986	1.6103 2432	1.7422 1349	32
33	1.5067 3214	1.5693 4569	1.6344 7918	1.7727 0223	33
34	1.5255 6629	1.5909 2419	1.6589 9637	1.8037 2452	34
35	1.5446 3587	1.6127 9940	1.6838 8132	1.8352 8970	35
36	1.5639 4382	1.6349 7539	1.7091 3954	1.8674 0727	36
37	1.5834 9312	1.6574 5630	1.7347 7663	1.9000 8689	37
38	1.6032 8678	1.6802 4633	1.7607 9828	1.9333 3841	38
39	1.6233 2787	1.7033 4971	1.7872 1025	1.9671 7184	39
40	1.6436 1946	1.7267 7077	1.8140 1841	2.0015 9734	40
41	1.6641 6471	1.7505 1387	1.8412 2868	2.0366 2530	41
42	1.6849 6677	1.7745 8343	1.8688 4712	2.0722 6624	42
43	1.7060 2885	1.7989 8396	1.8968 7982	2.1085 3090	43
44	1.7273 5421	1.8237 1999	1.9253 3302	2.1454 3019	44
45	1.7489 4614	1.8487 9614	1.9542 1301	2.1829 7522	45
46	1.7708 0797	1.8742 1708	1.9835 2621	2.2211 7728	46
47	1.7929 4306	1.8999 8757	2.0132 7910	2.2600 4789	47
48	1.8153 5485	1.9261 1240	2.0434 7829	2.2995 9872	48
49	1.8380 4679	1.9525 9644	2.0741 3046	2.3398 4170	49
50	1.8610 2237	1.9794 4464	2.1052 4242	2.3807 8893	50

Amount of 1 at Compound Interest

$(1+i)^n$

n	1¼%	1⅜%	1½%	1¾%	n
51	1.8842 8515	2.0066 6201	2.1368 2106	2.4224 5274	51
52	1.9078 3872	2.0342 5361	2.1688 7337	2.4648 4566	52
53	1.9316 8670	2.0622 2460	2.2014 0647	2.5079 8046	53
54	1.9558 3279	2.0905 8019	2.2344 2757	2.5518 7012	54
55	1.9802 8070	2.1193 2566	2.2679 4398	2.5965 2785	55
56	2.0050 3420	2.1484 6639	2.3019 6314	2.6419 6708	56
57	2.0300 9713	2.1780 0780	2.3364 9259	2.6882 0151	57
58	2.0554 7335	2.2079 5541	2.3715 3998	2.7352 4503	58
59	2.0811 6676	2.2383 1480	2.4071 1308	2.7831 1182	59
60	2.1071 8135	2.2690 9163	2.4432 1978	2.8318 1628	60
61	2.1335 2111	2.3002 9164	2.4798 6807	2.8813 7306	61
62	2.1601 9013	2.3319 2065	2.5170 6609	2.9317 9709	62
63	2.1871 9250	2.3639 8456	2.5548 2208	2.9831 0354	63
64	2.2145 3241	2.3964 8934	2.5931 4442	3.0343 0785	64
65	2.2422 1407	2.4294 4107	2.6320 4158	3.0884 2574	65
66	2.2702 4174	2.4628 4589	2.6715 2221	3.1424 7319	66
67	2.2986 1976	2.4967 1002	2.7115 9504	3.1974 6647	67
68	2.3273 5251	2.5310 3978	2.7522 6896	3.2534 2213	68
69	2.3564 4442	2.5658 4158	2.7935 5300	3.3103 5702	69
70	2.3858 9997	2.6011 2190	2.8354 5629	3.3682 8827	70
71	2.4157 2372	2.6368 8732	2.8779 8814	3.4272 3331	71
72	2.4459 2027	2.6731 4453	2.9211 5796	3.4872 0990	72
73	2.4764 9427	2.7099 0026	2.9649 7533	3.5482 3607	73
74	2.5074 5045	2.7471 6139	3.0094 4996	3.6103 3020	74
75	2.5387 9358	2.7849 3486	3.0545 9171	3.6735 1098	75
76	2.5705 2850	2.8232 2771	3.1004 1059	3.7377 9742	76
77	2.6026 6011	2.8620 4710	3.1469 1674	3.8032 0888	77
78	2.6351 9336	2.9014 0024	3.1941 2050	3.8697 6503	78
79	2.6681 3327	2.9412 9450	3.2420 3230	3.9374 8592	79
80	2.7014 8494	2.9817 3730	3.2906 6279	4.0063 9192	80
81	2.7352 5350	3.0227 3618	3.3400 2273	4.0765 0378	81
82	2.7694 4417	3.0642 9881	3.3901 2307	4.1478 4260	82
83	2.8040 6222	3.1064 3291	3.4409 7492	4.2204 2984	83
84	2.8391 1300	3.1491 4637	3.4925 8954	4.2942 8737	84
85	2.8746 0191	3.1924 4713	3.5449 7838	4.3694 3740	85
86	2.9105 3444	3.2363 4328	3.5981 5306	4.4459 0255	86
87	2.9469 1612	3.2808 4300	3.6521 2535	4.5237 0584	87
88	2.9837 5257	3.3259 5459	3.7069 0723	4.6028 7070	88
89	3.0210 4948	3.3716 8646	3.7625 1084	4.6834 2093	89
90	3.0588 1260	3.4180 4715	3.8189 4851	4.7653 8080	90
91	3.0970 4775	3.4650 4530	3.8762 3273	4.8487 7496	91
92	3.1357 6085	3.5126 8967	3.9343 7622	4.9336 2853	92
93	3.1749 5786	3.5609 8916	3.9933 9187	5.0199 6703	93
94	3.2146 4483	3.6099 5276	4.0532 9275	5.1078 1645	94
95	3.2548 2789	3.6595 8961	4.1140 9214	5.1972 0324	95
96	3.2955 1324	3.7099 0897	4.1758 0352	5.2881 5429	96
97	3.3367 0716	3.7609 2021	4.2384 4057	5.3806 9699	97
98	3.3784 1600	3.8126 3287	4.3020 1718	5.4748 5919	98
99	3.4206 4620	3.8650 5657	4.3665 4744	5.5706 6923	99
100	3.4634 0427	3.9182 0110	4.4320 4565	5.6681 5594	100

Amount of 1 at Compound Interest

$$(1+i)^n$$

n	2%	2¼%	2½%	2¾%	n
1	1.0200 0000	1.0225 0000	1.0250 0000	1.0275 0000	1
2	1.0404 0000	1.0455 0625	1.0506 2500	1.0557 5625	2
3	1.0612 0800	1.0690 3014	1.0768 9063	1.0847 8955	3
4	1.0824 3216	1.0930 8332	1.1038 1289	1.1146 2126	4
5	1.1040 8080	1.1176 7769	1.1314 0821	1.1452 7334	5
6	1.1261 6242	1.1428 2544	1.1596 9342	1.1767 6836	6
7	1.1486 8567	1.1685 3901	1.1886 8575	1.2091 2949	7
8	1.1716 5938	1.1948 3114	1.2184 0290	1.2423 8055	8
9	1.1950 9257	1.2217 1484	1.2488 6297	1.2765 4602	9
10	1.2189 9442	1.2492 0343	1.2800 8454	1.3116 5103	10
11	1.2433 7431	1.2773 1050	1.3120 8666	1.3477 2144	11
12	1.2682 4179	1.3060 4999	1.3448 8882	1.3847 8378	12
13	1.2936 0663	1.3354 3611	1.3785 1104	1.4228 6533	13
14	1.3194 7876	1.3654 8343	1.4129 7382	1.4619 9413	14
15	1.3458 6834	1.3962 0680	1.4482 9817	1.5021 9896	15
16	1.3727 8571	1.4276 2146	1.4845 0562	1.5435 0944	16
17	1.4002 4142	1.4597 4294	1.5216 1826	1.5859 5595	17
18	1.4282 4625	1.4925 8716	1.5596 5872	1.6295 6973	18
19	1.4568 1117	1.5261 7037	1.5986 5019	1.6743 8290	19
20	1.4859 4740	1.5605 0920	1.6386 1644	1.7204 2843	20
21	1.5156 6634	1.5956 2066	1.6795 8185	1.7677 4021	21
22	1.5459 7967	1.6315 2212	1.7215 7140	1.8163 5307	22
23	1.5768 9926	1.6682 3137	1.7646 1068	1.8663 0278	23
24	1.6084 3725	1.7057 6658	1.8087 2595	1.9176 2610	24
25	1.6406 0599	1.7441 4632	1.8539 4410	1.9703 6082	25
26	1.6734 1811	1.7833 8962	1.9002 9270	2.0245 4575	26
27	1.7068 8648	1.8235 1588	1.9478 0002	2.0802 2075	27
28	1.7410 2421	1.8645 4499	1.9964 9502	2.1374 2682	28
29	1.7758 4469	1.9064 9725	2.0464 0739	2.1962 0606	29
30	1.8113 6158	1.9493 9344	2.0975 6758	2.2566 0173	30
31	1.8475 8882	1.9932 5479	2.1500 0677	2.3186 5828	31
32	1.8845 4059	2.0381 0303	2.2037 5694	2.3824 2138	32
33	1.9222 3140	2.0839 6034	2.2588 5086	2.4479 3797	33
34	1.9606 7603	2.1308 4945	2.3153 2213	2.5152 5626	34
35	1.9998 8955	2.1787 9356	2.3732 0519	2.5844 2581	35
36	2.0398 8734	2.2278 1642	2.4325 3532	2.6554 9752	36
37	2.0806 8509	2.2779 4229	2.4933 4870	2.7285 2370	37
38	2.1222 9879	2.3291 9599	2.5556 8242	2.8035 5810	38
39	2.1647 4477	2.3816 0290	2.6195 7448	2.8806 5595	39
40	2.2080 3966	2.4351 8897	2.6850 6384	2.9598 7399	40
41	2.2522 0046	2.4899 8072	2.7521 9043	3.0412 7052	41
42	2.2972 4447	2.5460 0528	2.8209 9520	3.1249 0546	42
43	2.3431 8936	2.6032 9040	2.8915 2008	3.2108 4036	43
44	2.3900 5314	2.6618 6444	2.9638 0808	3.2991 3847	44
45	2.4378 5421	2.7217 5639	3.0379 0328	3.3898 6478	45
46	2.4866 1129	2.7829 9590	3.1138 5086	3.4830 8606	46
47	2.5363 4351	2.8456 1331	3.1916 9713	3.5788 7093	47
48	2.5870 7039	2.9096 3961	3.2714 8956	3.6772 8988	48
49	2.6388 1179	2.9751 0650	3.3532 7680	3.7784 1535	49
50	2.6915 8803	3.0420 4640	3.4371 0872	3.8823 2177	50

Amount of 1 at Compound Interest

$(1+i)^n$

n	2%	$2\frac{1}{4}\%$	$2\frac{1}{2}\%$	$2\frac{3}{4}\%$	n
51	2.7454 1979	3.1104 9244	3.5230 3644	3.9890 8562	51
52	2.8003 2819	3.1804 7852	3.6111 1235	4.0987 8547	52
53	2.8563 3475	3.2520 3929	3.7013 9016	4.2115 0208	53
54	2.9134 6144	3.3252 1017	3.7939 2491	4.3273 1838	54
55	2.9717 3067	3.4000 2740	3.8887 7303	4.4463 1964	55
56	3.0311 6529	3.4765 2802	3.9859 9236	4.5685 9343	56
57	3.0917 8859	3.5547 4990	4.0856 4217	4.6942 2975	57
58	3.1536 2436	3.6347 3177	4.1877 8322	4.8233 2107	58
59	3.2166 9685	3.7165 1324	4.2924 7780	4.9559 6239	59
60	3.2810 3079	3.8001 3479	4.3997 8975	5.0922 5136	60
61	3.3466 5140	3.8856 3782	4.5097 8449	5.2322 8827	61
62	3.4135 8443	3.9730 6467	4.6225 2910	5.3761 7620	62
63	3.4818 5612	4.0624 5862	4.7380 9233	5.5240 2105	63
64	3.5514 9324	4.1538 6394	4.8565 4464	5.6759 3162	64
65	3.6225 2311	4.2473 2588	4.9779 5826	5.8320 1974	65
66	3.6949 7357	4.3428 9071	5.1024 0721	5.9924 0029	66
67	3.7688 7304	4.4406 0576	5.2299 6739	6.1571 9130	67
68	3.8442 5050	4.5405 1939	5.3607 1658	6.3265 1406	68
69	3.9211 3551	4.6426 8107	5.4947 3449	6.5004 9319	69
70	3.9995 5822	4.7471 4140	5.6321 0286	6.6792 5676	70
71	4.0795 4939	4.8539 5208	5.7729 0543	6.8629 3632	71
72	4.1611 4038	4.9631 6600	5.9172 2806	7.0516 6706	72
73	4.2443 6318	5.0748 3723	6.0651 5876	7.2455 8791	73
74	4.3292 5045	5.1890 2107	6.2167 8773	7.4448 4158	74
75	4.4158 3546	5.3057 7405	6.3722 0743	7.6495 7472	75
76	4.5041 5216	5.4251 5396	6.5315 1261	7.8599 3802	76
77	4.5942 3521	5.5472 1993	6.6948 0043	8.0760 8632	77
78	4.6861 1991	5.6720 3237	6.8621 7044	8.2981 7869	78
79	4.7798 4231	5.7996 5310	7.0337 2470	8.5263 7861	79
80	4.8754 3916	5.9301 4530	7.2095 6782	8.7608 5402	80
81	4.9729 4794	6.0635 7357	7.3898 0701	9.0017 7751	81
82	5.0724 0690	6.2000 0397	7.5745 5219	9.2493 2639	82
83	5.1738 5504	6.3395 0406	7.7639 1599	9.5036 8286	83
84	5.2773 3214	6.4821 4290	7.9580 1389	9.7650 3414	84
85	5.3828 7878	6.6279 9112	8.1569 6424	10.0335 7258	85
86	5.4905 3636	6.7771 2092	8.3608 8834	10.3094 9583	86
87	5.6003 4708	6.9296 0614	8.5699 1055	10.5930 0696	87
88	5.7123 5402	7.0855 2228	8.7841 5832	10.8843 1465	88
89	5.8266 0110	7.2449 4653	9.0037 6228	11.1836 3331	89
90	5.9431 3313	7.4079 5782	9.2288 5633	11.4911 8322	90
91	6.0619 9579	7.5746 3688	9.4595 7774	11.8071 9076	91
92	6.1832 3570	7.7450 6621	9.6960 6718	12.1318 8851	92
93	6.3069 0042	7.9193 3020	9.9384 6886	12.4655 1544	93
94	6.4330 3843	8.0975 1512	10.1869 3058	12.8083 1711	94
95	6.5616 9920	8.2797 0921	10.4416 0385	13.1605 4584	95
96	6.6929 3318	8.4660 0267	10.7026 4395	13.5224 6085	96
97	6.8267 9184	8.6564 8773	10.9702 1004	13.8943 2852	97
98	6.9633 2768	8.8512 5871	11.2444 6530	14.2764 2255	98
99	7.1025 9423	9.0504 1203	11.5255 7693	14.6690 2417	99
100	7.2446 4612	9.2540 4630	11.8137 1635	15.0724 2234	100

Amount of 1 at Compound Interest

$(1+i)^n$

n	3%	3½%	4%	4½%	n
1	1.0300 0000	1.0350 0000	1.0400 0000	1.0450 0000	1
2	1.0609 0000	1.0712 2500	1.0816 0000	1.0920 2500	2
3	1.0927 2700	1.1087 1788	1.1248 6400	1.1411 6613	3
4	1.1255 0881	1.1475 2300	1.1698 5856	1.1925 1860	4
5	1.1592 7407	1.1876 8631	1.2166 5290	1.2461 8194	5
6	1.1940 5230	1.2292 5533	1.2653 1902	1.3022 6012	6
7	1.2298 7387	1.2722 7926	1.3159 3178	1.3608 6183	7
8	1.2667 7008	1.3168 0904	1.3685 6905	1.4221 0061	8
9	1.3047 7318	1.3628 9735	1.4233 1181	1.4860 9514	9
10	1.3439 1638	1.4105 9876	1.4802 4428	1.5529 6942	10
11	1.3842 3387	1.4599 6972	1.5394 5406	1.6228 5305	11
12	1.4257 6089	1.5110 6866	1.6010 3222	1.6958 8143	12
13	1.4685 3371	1.5639 5606	1.6650 7351	1.7721 9610	13
14	1.5125 8972	1.6186 9452	1.7316 7645	1.8519 4492	14
15	1.5579 6742	1.6753 4883	1.8009 4351	1.9352 8244	15
16	1.6047 0644	1.7339 8604	1.8729 8125	2.0223 7015	16
17	1.6528 4763	1.7946 7555	1.9479 0050	2.1133 7681	17
18	1.7024 3306	1.8574 8920	2.0258 1652	2.2084 7877	18
19	1.7535 0605	1.9225 0132	2.1068 4918	2.3078 6031	19
20	1.8061 1123	1.9897 8886	2.1911 2314	2.4117 1402	20
21	1.8602 9457	2.0594 3147	2.2787 6807	2.5202 4116	21
22	1.9161 0341	2.1315 1158	2.3699 1879	2.6336 5201	22
23	1.9735 8651	2.2061 1448	2.4647 1554	2.7521 6635	23
24	2.0327 9411	2.2833 2849	2.5633 0416	2.8760 1383	24
25	2.0937 7793	2.3632 4498	2.6658 3633	3.0054 3446	25
26	2.1565 9127	2.4459 5856	2.7724 6978	3.1406 7901	26
27	2.2212 8901	2.5315 6711	2.8833 6858	3.2820 0956	27
28	2.2879 2768	2.6201 7196	2.9987 0332	3.4296 9999	28
29	2.3565 6551	2.7118 7798	3.1186 5145	3.5840 3649	29
30	2.4272 6247	2.8067 9370	3.2433 9751	3.7453 1813	30
31	2.5000 8035	2.9050 3148	3.3731 3341	3.9138 5745	31
32	2.5750 8276	3.0067 0759	3.5080 5875	4.0899 8104	32
33	2.6523 3524	3.1119 4235	3.6483 8110	4.2740 3018	33
34	2.7319 0530	3.2208 6033	3.7943 1634	4.4663 6154	34
35	2.8138 6245	3.3335 9045	3.9460 8899	4.6673 4781	35
36	2.8982 7833	3.4502 6611	4.1039 3255	4.8773 7846	36
37	2.9852 2668	3.5710 2543	4.2680 8986	5.0968 6049	37
38	3.0747 8348	3.6960 1132	4.4388 1345	5.3262 1921	38
39	3.1670 2698	3.8253 7171	4.6168 6599	5.5658 9908	39
40	3.2620 3779	3.9592 5972	4.8010 2063	5.8163 6454	40
41	3.3598 9893	4.0978 3381	4.9930 6145	6.0781 0094	41
42	3.4606 9589	4.2412 5799	5.1927 8391	6.3516 1548	42
43	3.5645 1677	4.3897 0202	5.4004 9527	6.6374 3818	43
44	3.6714 5227	4.5433 4160	5.6165 1508	6.9361 2290	44
45	3.7815 9584	4.7023 5855	5.8411 7568	7.2482 4843	45
46	3.8950 4372	4.8669 4110	6.0748 2271	7.5744 1961	46
47	4.0118 9503	5.0372 8404	6.3178 1562	7.9152 6849	47
48	4.1322 5188	5.2135 8898	6.5705 2824	8.2714 5557	48
49	4.2562 1944	5.3960 6459	6.8333 4937	8.6436 7107	49
50	4.3839 0602	5.5849 2686	7.1066 8335	9.0326 3627	50

Amount of 1 at Compound Interest

$(1+i)^n$

n	3%	3½%	4%	4½%	n
51	4.5154 2320	5.7803 9930	7.3909 5068	9.4391 0490	51
52	4.6508 8590	5.9827 1327	7.6865 8871	9.8638 6463	52
53	4.7904 1247	6.1921 0824	7.9940 5226	10.3077 3853	53
54	4.9341 2485	6.4088 3202	8.3138 1435	10.7715 8677	54
55	5.0821 4859	6.6331 4114	8.6463 6692	11.2563 0817	55
56	5.2346 1305	6.8653 0108	8.9922 2160	11.7628 4204	56
57	5.3916 5144	7.1055 8662	9.3519 1046	12.2921 6993	57
58	5.5534 0098	7.3542 8215	9.7259 8688	12.8453 1758	58
59	5.7200 0301	7.6116 8203	10.1150 2635	13.4233 5687	59
60	5.8916 0310	7.8780 9090	10.5196 2741	14.0274 0793	60
61	6.0683 5120	8.1538 2408	10.9404 1250	14.6586 4129	61
62	6.2504 0173	8.4392 0793	11.3780 2900	15.3182 8014	62
63	6.4379 1379	8.7345 8020	11.8331 5016	16.0076 0275	63
64	6.6310 5120	9.0402 9051	12.3064 7617	16.7279 4487	64
65	6.8299 8273	9.3567 0068	12.7987 3522	17.4807 0239	65
66	7.0348 8222	9.6841 8520	13.3106 8463	18.2673 3400	66
67	7.2459 2868	10.0231 3168	13.8431 1201	19.0893 6403	67
68	7.4633 0654	10.3739 4129	14.3968 3649	19.9483 8541	68
69	7.6872 0574	10.7370 2924	14.9727 0995	20.8460 6276	69
70	7.9178 2191	11.1128 2526	15.5716 1835	21.7841 3558	70
71	8.1553 5657	11.5017 7414	16.1944 8308	22.7644 2168	71
72	8.4000 1727	11.9043 3624	16.8422 6241	23.7888 2066	72
73	8.6520 1778	12.3209 8801	17.5159 5290	24.8593 1759	73
74	8.9115 7832	12.7522 2259	18.2165 9102	25.9779 8688	74
75	9.1789 2567	13.1985 5038	18.9452 5466	27.1469 9629	75
76	9.4542 9344	13.6604 9964	19.7030 6485	28.3686 1112	76
77	9.7379 2224	14.1386 1713	20.4911 8744	29.6451 9862	77
78	10.0300 5991	14.6334 6873	21.3108 3494	30.9792 3256	78
79	10.3309 6171	15.1456 4013	22.1632 6834	32.3732 9802	79
80	10.6408 9056	15.6757 3754	23.0497 9907	33.8300 9643	80
81	10.9601 1727	16.2243 8835	23.9717 9103	35.3524 5077	81
82	11.2889 2079	16.7922 4195	24.9306 6267	36.9433 1106	82
83	11.6275 8842	17.3799 7041	25.9278 8918	38.6057 6006	83
84	11.9764 1607	17.9882 6938	26.9650 0475	40.3430 1926	84
85	12.3357 0855	18.6178 5881	28.0436 0494	42.1584 5513	85
86	12.7057 7981	19.2694 8387	29.1653 4914	44.0555 8561	86
87	13.0869 5320	19.9439 1580	30.3319 6310	46.0380 8696	87
88	13.4795 6180	20.6419 5285	31.5452 4163	48.1098 0087	88
89	13.8839 4865	21.3644 2120	32.8070 5129	50.2747 4191	89
90	14.3004 6711	22.1121 7595	34.1193 3334	52.5371 0530	90
91	14.7294 8112	22.8861 0210	35.4841 0668	54.9012 7503	91
92	15.1713 6556	23.6871 1568	36.9034 7094	57.3718 3241	92
93	15.6265 0652	24.5161 6473	38.3796 0978	59.9535 6487	93
94	16.0953 0172	25.3742 3049	39.9147 9417	62.6514 7529	94
95	16.5781 6077	26.2623 2856	41.5113 8594	65.4707 9168	95
96	17.0755 0559	27.1815 1006	43.1718 4138	68.4169 7730	96
97	17.5877 7076	28.1328 6291	44.8987 1503	71.4957 4128	97
98	18.1154 0388	29.1175 1311	46.6946 6363	74.7130 4964	98
99	18.6588 6600	30.1366 2607	48.5624 5018	78.0751 3687	99
100	19.2186 3198	31.1914 0798	50.5049 4818	81.5885 1803	100

Amount of 1 at Compound Interest

$(1+i)^n$

n	5%	5½%	6%	6½%	*n*
1	1.0500 0000	1.0550 0000	1.0600 0000	1.0650 0000	1
2	1.1025 0000	1.1130 2500	1.1236 0000	1.1342 2500	2
3	1.1576 2500	1.1742 4138	1.1910 1600	1.2079 4963	3
4	1.2155 0625	1.2388 2465	1.2624 7696	1.2864 6635	4
5	1.2762 8156	1.3069 6001	1.3382 2558	1.3700 8666	5
6	1.3400 9564	1.3788 4281	1.4185 1911	1.4591 4230	6
7	1.4071 0042	1.4546 7916	1.5036 3026	1.5539 8655	7
8	1.4774 5544	1.5346 8651	1.5938 4807	1.6549 9567	8
9	1.5513 2822	1.6190 9427	1.6894 7896	1.7625 7039	9
10	1.6288 9463	1.7081 4446	1.7908 4770	1.8771 3747	10
11	1.7103 3936	1.8020 9240	1.8982 9856	1.9991 5140	11
12	1.7958 5633	1.9012 0749	2.0121 9647	2.1290 9624	12
13	1.8856 4914	2.0057 7390	2.1329 2826	2.2674 8750	13
14	1.9799 3160	2.1160 9146	2.2609 0396	2.4148 7418	14
15	2.0789 2818	2.2324 7649	2.3965 5819	2.5718 4101	15
16	2.1828 7459	2.3552 6270	2.5403 5168	2.7390 1067	16
17	2.2920 1832	2.4848 0215	2.6927 7279	2.9170 4637	17
18	2.4066 1923	2.6214 6627	2.8543 3915	3.1066 5438	18
19	2.5269 5020	2.7656 4691	3.0255 9950	3.3085 8691	19
20	2.6532 9771	2.9177 5749	3.2071 3547	3.5236 4506	20
21	2.7859 6259	3.0782 3415	3.3995 6360	3.7526 8199	21
22	2.9252 6072	3.2475 3703	3.6035 3742	3.9966 0632	22
23	3.0715 2376	3.4261 5157	3.8197 4966	4.2563 8573	23
24	3.2250 9994	3.6145 8990	4.0489 3464	4.5330 5081	24
25	3.3863 5494	3.8133 9235	4.2918 7072	4.8276 9911	25
26	3.5556 7269	4.0231 2893	4.5493 8296	5.1414 9955	26
27	3.7334 5632	4.2444 0102	4.8223 4594	5.4756 9702	27
28	3.9201 2914	4.4778 4307	5.1116 8670	5.8316 1733	28
29	4.1161 3560	4.7241 2444	5.4183 8790	6.2106 7245	29
30	4.3219 4238	4.9839 5129	5.7434 9117	6.6143 6616	30
31	4.5380 3949	5.2580 6861	6.0881 0064	7.0442 9996	31
32	4.7649 4147	5.5472 6238	6.4533 8668	7.5021 7946	32
33	5.0031 8854	5.8523 6181	6.8405 8988	7.9898 2113	33
34	5.2533 4797	6.1742 4171	7.2510 2528	8.5091 5950	34
35	5.5160 1537	6.5138 2501	7.6860 8679	9.0622 5487	35
36	5.7918 1614	6.8720 8538	8.1472 5200	9.6513 0143	36
37	6.0814 0694	7.2500 5008	8.6360 8712	10.2786 3603	37
38	6.3854 7729	7.6488 0283	9.1542 5235	10.9467 4737	38
39	6.7047 5115	8.0694 8699	9.7035 0749	11.6582 8595	39
40	7.0399 8871	8.5133 0877	10.2857 1794	12.4160 7453	40
41	7.3919 8815	8.9815 4076	10.9028 6101	13.2231 1938	41
42	7.7615 8756	9.4755 2550	11.5570 3267	14.0826 2214	42
43	8.1496 6693	9.9966 7940	12.2504 5463	14.9979 9258	43
44	8.5571 5028	10.5464 9677	12.9854 8191	15.9728 6209	44
45	8.9850 0779	11.1265 5409	13.7646 1083	17.0110 9813	45
46	9.4342 5818	11.7385 1456	14.5904 8748	18.1168 1951	46
47	9.9059 7109	12.3841 3287	15.4659 1673	19.2944 1278	47
48	10.4012 6965	13.0652 6017	16.3938 7173	20.5485 4961	48
49	10.9213 3313	13.7838 4948	17.3775 0403	21.8842 0533	49
50	11.4673 9979	14.5419 6120	18.4201 5427	23.3066 7868	50

Amount of 1 at Compound Interest

$(1+i)^n$

n	5%	5½%	6%	6½%	*n*
51	12.0407 6978	15.3417 6907	19.5253 6353	24.8216 1279	51
52	12.6428 0826	16.1855 6637	20.6968 8534	26.4350 1762	52
53	13.2749 4868	17.0757 7252	21.9386 9846	28.1532 9377	53
54	13.9386 9611	18.0149 4001	23.2550 2037	29.9832 5786	54
55	14.6356 3092	19.0057 6171	24.6503 2159	31.9321 6963	55
56	15.3674 1246	20.0510 7860	26.1293 4089	34.0077 6065	56
57	16.1357 8309	21.1538 8793	27.6971 0134	36.2182 6509	57
58	16.9425 7224	22.3173 5176	29.3589 2742	38.5724 5233	58
59	17.7897 0085	23.5448 0611	31.1204 6307	41.0796 6173	59
60	18.6791 8589	24.8397 7045	32.9876 9085	43.7498 3974	60
61	19.6131 4519	26.2059 5782	34.9669 5230	46.5935 7932	61
62	20.5938 0245	27.6472 8550	37.0649 6944	49.6221 6198	62
63	21.6234 9257	29.1678 8620	39.2888 6761	52.8476 0251	63
64	22.7046 6720	30.7721 1994	41.6461 9967	56.2826 9667	64
65	23.8399 0056	32.4645 8654	44.1449 7165	59.9410 7195	65
66	25.0318 9559	34.2501 3880	46.7936 6994	63.8372 4163	66
67	26.2834 9037	36.1338 9643	49.6012 9014	67.9866 6234	67
68	27.5976 6488	38.1212 6074	52.5773 6755	72.4057 9539	68
69	28.9775 4813	40.2179 3008	55.7320 0960	77.1121 7209	69
70	30.4264 2554	42.4299 1623	59.0759 3018	82.1244 6327	70
71	31.9477 4681	44.7635 6163	62.6204 8599	87.4625 5339	71
72	33.5451 3415	47.2255 5751	66.3777 1515	93.1476 1936	72
73	35.2223 9086	49.8229 6318	70.3603 7806	99.2022 1461	73
74	36.9835 1040	52.5632 2615	74.5820 0074	105.6503 5856	74
75	38.8326 8592	55.4542 0359	79.0569 2079	112.5176 3187	75
76	40.7743 2022	58.5041 8479	83.8003 3603	119.8312 7794	76
77	42.8130 3623	61.7219 1495	88.8283 5620	127.6203 1101	77
78	44.9536 8804	65.1166 2027	94.1580 5757	135.9156 3122	78
79	47.2013 7244	68.6980 3439	99.8075 4102	144.7501 4725	79
80	49.5614 4107	72.4764 2628	105.7959 9348	154.1589 0683	80
81	52.0395 1312	76.4626 2973	112.1437 5309	164.1792 3577	81
82	54.6414 8878	80.6680 7436	118.8723 7828	174.8508 8609	82
83	57.3735 6322	85.1048 1845	126.0047 2097	186.2161 9369	83
84	60.2422 4138	89.7855 8347	133.5650 0423	198.3202 4628	84
85	63.2543 5344	94.7237 9056	141.5789 0449	211.2110 6229	85
86	66.4170 7112	99.9335 9904	150.0736 3875	224.9397 8134	86
87	69.7379 2467	105.4299 4698	159.0780 5708	239.5608 6712	87
88	73.2248 2091	111.2285 9407	168.6227 4050	255.1323 2349	88
89	76.8860 6195	117.3461 6674	178.7401 0493	271.7159 2451	89
90	80.7303 6505	123.8002 0591	189.4645 1123	289.3774 5961	90
91	84.7668 8330	130.6092 1724	200.8323 8190	308.1869 9448	91
92	89.0052 2747	137.7927 2419	212.8823 2482	328.2191 4912	92
93	93.4554 8884	145.3713 2402	225.6552 6431	349.5533 9382	93
94	98.1282 6328	153.3667 4684	239.1945 8017	372.2743 6441	94
95	103.0346 7645	161.8019 1791	253.5462 5498	396.4721 9810	95
96	108.1864 1027	170.7010 2340	268.7590 3028	422.2428 9098	96
97	113.5957 3078	180.0895 7969	284.8845 7209	449.6886 7889	97
98	119.2755 1732	189.9945 0657	301.9776 4642	478.9184 4302	98
99	125.2392 9319	200.4442 0443	320.0963 0520	510.0481 4181	99
100	131.5012 5785	211.4686 3567	339.3020 8351	543.2012 7103	100

Amount of 1 at Compound Interest

$(1+i)^n$

n	7%	7½%	8%	8½%	n
1	1.0700 0000	1.0750 0000	1.0800 0000	1.0850 0000	1
2	1.1449 0000	1.1556 2500	1.1664 0000	1.1772 2500	2
3	1.2250 4300	1.2422 9688	1.2597 1200	1.2772 8913	3
4	1.3107 9601	1.3354 6914	1.3604 8896	1.3858 5870	4
5	1.4025 5173	1.4356 2933	1.4693 2808	1.5036 5669	5
6	1.5007 3035	1.5433 0153	1.5868 7432	1.6314 6751	6
7	1.6057 8148	1.6590 4914	1.7138 2427	1.7701 4225	7
8	1.7181 8618	1.7834 7783	1.8509 3021	1.9206 0434	8
9	1.8384 5921	1.9172 3866	1.9990 0463	2.0838 5571	9
10	1.9671 5136	2.0610 3156	2.1589 2500	2.2609 8344	10
11	2.1048 5195	2.2156 0893	2.3316 3900	2.4531 6703	11
12	2.2521 9159	2.3817 7960	2.5181 7012	2.6616 8623	12
13	2.4098 4500	2.5604 1307	2.7196 2373	2.8879 2956	13
14	2.5785 3415	2.7524 4405	2.9371 9362	3.1334 0357	14
15	2.7590 3154	2.9588 7735	3.1721 6911	3.3997 4288	15
16	2.9521 6375	3.1807 9315	3.4259 4264	3.6887 2102	16
17	3.1588 1521	3.4193 5264	3.7000 1805	4.0022 6231	17
18	3.3799 3228	3.6758 0409	3.9960 1950	4.3424 5461	18
19	3.6165 2754	3.9514 8940	4.3157 0106	4.7115 6325	19
20	3.8696 8446	4.2478 5110	4.6609 5714	5.1120 4612	20
21	4.1405 6237	4.5664 3993	5.0338 3372	5.5465 7005	21
22	4.4304 0174	4.9089 2293	5.4365 4041	6.0180 2850	22
23	4.7405 2986	5.2770 9215	5.8714 6365	6.5295 6092	23
24	5.0723 6695	5.6728 7406	6.3411 8074	7.0845 7360	24
25	5.4274 3264	6.0983 3961	6.8484 7520	7.6867 6236	25
26	5.8073 5292	6.5557 1508	7.3963 5321	8.3401 3716	26
27	6.2138 6763	7.0473 9371	7.9880 6147	9.0490 4881	27
28	6.6488 3836	7.5759 4824	8.6271 0639	9.8182 1796	28
29	7.1142 5705	8.1441 4436	9.3172 7490	10.6527 6649	29
30	7.6122 5504	8.7549 5519	10.0626 5689	11.5582 5164	30
31	8.1451 1290	9.4115 7683	10.8676 6944	12.5407 0303	31
32	8.7152 7080	10.1174 4509	11.7370 8300	13.6066 6279	32
33	9.3253 3975	10.8762 5347	12.6760 4964	14.7632 2913	33
34	9.9781 1354	11.6919 7248	13.6901 3361	16.0181 0360	34
35	10.6765 8148	12.5688 7042	14.7853 4429	17.3796 4241	35
36	11.4239 4219	13.5115 3570	15.9681 7184	18.8569 1201	36
37	12.2236 1814	14.5249 0088	17.2456 2558	20.4597 4953	37
38	13.0792 7141	15.6142 6844	18.6252 7563	22.1988 2824	38
39	13.9948 2041	16.7853 3858	20.1152 9768	24.0857 2865	39
40	14.9744 5784	18.0442 3897	21.7245 2150	26.1330 1558	40
41	16.0226 6989	19.3975 5689	23.4624 8322	28.3543 2190	41
42	17.1442 5678	20.8523 7366	25.3394 8187	30.7644 3927	42
43	18.3443 5475	22.4163 0168	27.3666 4042	33.3794 1660	43
44	19.6284 5959	24.0975 2431	29.5559 7166	36.2166 6702	44
45	21.0024 5176	25.9048 3863	31.9204 4939	39.2950 8371	45
46	22.4726 2338	27.8477 0153	34.4740 8534	42.6351 6583	46
47	24.0457 0702	29.9362 7915	37.2320 1217	46.2591 5492	47
48	25.7289 0651	32.1815 0008	40.2105 7314	50.1911 8309	48
49	27.5299 2997	34.5951 1259	43.4274 1899	54.4574 3365	49
50	29.4570 2506	37.1897 4603	46.9016 1251	59.0863 1551	50

Amount of 1 at Compound Interest

$$(1+i)^n$$

n	7%	7½%	8%	8½%	n
51	31.5190 1682	39.9789 7698	50.6537 4151	64.1086 5233	51
52	33.7253 4799	42.9774 0026	54.7060 4084	69.5578 8778	52
53	36.0861 2235	46.2007 0528	59.0825 2410	75.4703 0824	53
54	38.6121 5092	49.6657 5817	63.8091 2603	81.8852 8444	54
55	41.3150 0148	53.3906 9004	68.9138 5611	88.8455 3362	55
56	44.2070 5159	57.3949 9179	74.4269 6460	96.3974 0398	56
57	47.3015 4520	61.6996 1617	80.3811 2177	104.5911 8332	57
58	50.6126 5336	66.3270 8739	86.8116 1151	113.4814 3390	58
59	54.1555 3910	71.3016 1894	93.7565 4043	123.1273 5578	59
60	57.9464 2683	76.6492 4036	101.2570 6367	133.5931 8102	60
61	62.0026 7671	82.3979 3339	109.3576 2876	144.9486 0141	61
62	66.3428 6408	88.5777 7839	118.1062 3906	157.2692 3253	62
63	70.9868 6457	95.2211 1177	127.5547 3819	170.6371 1729	63
64	75.9559 4509	102.3626 9515	137.7591 1724	185.1412 7226	64
65	81.2728 6124	110.0398 9729	148.7798 4662	200.8782 8041	65
66	86.9619 6153	118.2928 8959	160.6822 3435	217.9529 3424	66
67	93.0492 9884	127.1648 5631	173.5368 1310	236.4789 3365	67
68	99.5627 4976	136.7022 2053	187.4197 5815	256.5796 4301	68
69	106.5321 4224	146.9548 8707	202.4133 3880	278.3889 1267	69
70	113.9893 9220	157.9765 0360	218.6064 0590	302.0519 7024	70
71	121.9686 4965	169.8247 4137	236.0949 1837	327.7263 8771	71
72	130.5064 5513	182.5615 9697	254.9825 1184	355.5831 3067	72
73	139.6419 0699	196.2537 1675	275.3811 1279	385.8076 9678	73
74	149.4168 4047	210.9727 4550	297.4116 0181	418.6013 5100	74
75	159.8760 1931	226.7957 0141	321.2045 2996	454.1824 6584	75
76	171.0673 4066	243.8053 7902	346.9008 9236	492.7879 7543	76
77	183.0420 5451	262.0907 8245	374.6529 6374	534.6749 5335	77
78	195.8549 9832	281.7475 9113	404.6252 0084	580.1223 2438	78
79	209.5648 4820	302.8786 6046	436.9952 1691	629.4327 2195	79
80	224.2343 8758	325.5945 6000	471.9548 3426	682.9345 0332	80
81	239.9307 9471	350.0141 5200	509.7112 2101	740.9839 3610	81
82	256.7259 5034	376.2652 1340	550.4881 1869	803.9675 7067	82
83	274.6967 6686	404.4851 0440	594.5271 6818	872.3048 1418	83
84	293.9255 4054	434.8214 8723	642.0893 4164	946.4507 2338	84
85	314.5003 2838	467.4330 9878	693.4564 8897	1026.8990 3487	85
86	336.5153 5137	502.4905 8119	748.9330 0808	1114.1854 5283	86
87	360.0714 2596	540.1773 7477	808.8476 4873	1208.8912 1633	87
88	385.2764 2578	580.6906 7788	873.5554 6063	1311.6469 6971	88
89	412.2457 7558	624.2424 7872	943.4398 9748	1423.1369 6214	89
90	441.1029 7988	671.0606 6463	1018.9150 8928	1544.1036 0392	90
91	471.9801 8847	721.3902 1447	1100.4282 9642	1675.3524 1025	91
92	505.0188 0166	775.4944 8056	1188.4625 6013	1817.7573 6512	92
93	540.3701 1778	833.6565 6660	1283.5395 6494	1972.2667 4116	93
94	578.1960 2602	896.1808 0910	1386.2227 3014	2139.9094 1416	94
95	618.6697 4784	963.3943 6978	1497.1205 4855	2321.8017 1436	95
96	661.9766 3019	1035.6489 4751	1610.8901 9244	2519.1548 6008	96
97	708.3149 9430	1113.3226 1858	1746.2414 0783	2733.2830 2319	97
98	757.8970 4390	1196.8218 1497	1885.9407 2046	2965.6120 8016	98
99	810.9498 3698	1286.5834 5109	2036.8159 7809	3217.6891 0698	99
100	867.7163 2557	1383.0772 0993	2199.7612 5634	3491.1926 8107	100

Present Value of 1 at Compound Interest

$$v^n = (1+i)^{-n}$$

n	$\frac{1}{4}\%$	$\frac{7}{24}\%$	$\frac{1}{3}\%$	$\frac{5}{12}\%$	n
1	0.9975 0623	0.9970 9182	0.9966 7774	0.9958 5062	1
2	0.9950 1869	0.9941 9209	0.9933 6652	0.9917 1846	2
3	0.9925 3734	0.9913 0079	0.9900 6630	0.9876 0345	3
4	0.9900 6219	0.9884 1791	0.9867 7704	0.9835 0551	4
5	0.9875 9321	0.9855 4341	0.9834 9871	0.9794 2457	5
6	0.9851 3038	0.9826 7726	0.9802 3127	0.9753 6057	6
7	0.9826 7370	0.9798 1946	0.9769 7469	0.9713 1343	7
8	0.9802 2314	0.9769 6996	0.9737 2893	0.9672 8308	8
9	0.9777 7869	0.9741 2875	0.9704 9395	0.9632 6946	9
10	0.9753 4034	0.9712 9580	0.9672 6972	0.9592 7249	10
11	0.9729 0807	0.9684 7110	0.9640 5620	0.9552 9211	11
12	0.9704 8187	0.9656 5460	0.9608 5335	0.9513 2824	12
13	0.9680 6171	0.9628 4630	0.9576 6115	0.9473 8082	13
14	0.9656 4759	0.9600 4617	0.9544 7955	0.9434 4978	14
15	0.9632 3949	0.9572 5418	0.9513 0852	0.9395 3505	15
16	0.9608 3740	0.9544 7030	0.9481 4803	0.9356 3656	16
17	0.9584 4130	0.9516 9453	0.9449 9803	0.9317 5425	17
18	0.9560 5117	0.9489 2682	0.9418 5851	0.9278 8805	18
19	0.9536 6700	0.9461 6717	0.9387 2941	0.9240 3789	19
20	0.9512 8878	0.9434 1554	0.9356 1071	0.9202 0371	20
21	0.9489 1649	0.9406 7191	0.9325 0236	0.9163 8544	21
22	0.9465 5011	0.9379 3627	0.9294 0435	0.9125 8301	22
23	0.9441 8964	0.9352 0857	0.9263 1663	0.9087 9636	23
24	0.9418 3505	0.9324 8881	0.9232 3916	0.9050 2542	24
25	0.9394 8634	0.9297 7696	0.9201 7192	0.9012 7012	25
26	0.9371 4348	0.9270 7300	0.9171 1487	0.8975 3041	26
27	0.9348 0646	0.9243 7690	0.9140 6798	0.8938 0622	27
28	0.9324 7527	0.9216 8864	0.9110 3121	0.8900 9748	28
29	0.9301 4990	0.9190 0820	0.9080 0453	0.8864 0413	29
30	0.9278 3032	0.9163 3556	0.9049 8790	0.8827 2610	30
31	0.9255 1653	0.9136 7068	0.9019 8130	0.8790 6334	31
32	0.9232 0851	0.9110 1356	0.8989 8468	0.8754 1577	32
33	0.9209 0624	0.9083 6416	0.8959 9802	0.8717 8334	33
34	0.9186 0972	0.9057 2247	0.8930 2128	0.8681 6599	34
35	0.9163 1892	0.9030 8847	0.8900 5444	0.8645 6364	35
36	0.9140 3384	0.9004 6212	0.8870 9745	0.8609 7624	36
37	0.9117 5445	0.8978 4341	0.8841 5028	0.8574 0372	37
38	0.9094 8075	0.8952 3231	0.8812 1290	0.8538 4603	38
39	0.9072 1272	0.8926 2881	0.8782 8528	0.8503 0310	39
40	0.9049 5034	0.8900 3288	0.8753 6739	0.8467 7487	40
41	0.9026 9361	0.8874 4450	0.8724 5920	0.8432 6128	41
42	0.9004 4250	0.8848 6365	0.8695 6066	0.8397 6227	42
43	0.8981 9701	0.8822 9030	0.8666 7175	0.8362 7778	43
44	0.8959 5712	0.8797 2444	0.8637 9245	0.8328 0775	44
45	0.8937 2281	0.8771 6604	0.8609 2270	0.8293 5211	45
46	0.8914 9407	0.8746 1508	0.8580 6249	0.8259 1082	46
47	0.8892 7090	0.8720 7153	0.8552 1179	0.8224 8380	47
48	0.8870 5326	0.8695 3539	0.8523 7055	0.8190 7100	48
49	0.8848 4116	0.8670 0662	0.8495 3876	0.8156 7237	49
50	0.8826 3457	0.8644 8520	0.8467 1637	0.8122 8784	50

Present Value of 1 at Compound Interest

$$v^n = (1+i)^{-n}$$

n	$\frac{1}{4}\%$	$\frac{7}{24}\%$	$\frac{1}{3}\%$	$\frac{5}{12}\%$	n
51	0.8804 3349	0.8619 7112	0.8439 0336	0.8089 1735	51
52	0.8782 3790	0.8594 6435	0.8410 9969	0.8055 6084	52
53	0.8760 4778	0.8569 6487	0.8383 0534	0.8022 1827	53
54	0.8738 6312	0.8544 7266	0.8355 2027	0.7988 8956	54
55	0.8716 8391	0.8519 8769	0.8327 4446	0.7955 7467	55
56	0.8695 1013	0.8495 0995	0.8299 7787	0.7922 7353	56
57	0.8673 4178	0.8470 3942	0.8272 2047	0.7889 8608	57
58	0.8651 7883	0.8445 7608	0.8244 7222	0.7857 1228	58
59	0.8630 2128	0.8421 1989	0.8217 3311	0.7824 5207	59
60	0.8608 6911	0.8396 7085	0.8190 0310	0.7792 0538	60
61	0.8587 2230	0.8372 2893	0.8162 8216	0.7759 7216	61
62	0.8565 8085	0.8347 9412	0.8135 7026	0.7727 5236	62
63	0.8544 4474	0.8323 6638	0.8108 6737	0.7695 4591	63
64	0.8523 1395	0.8299 4571	0.8081 7346	0.7663 5278	64
65	0.8501 8848	0.8275 3207	0.8054 8850	0.7631 7289	65
66	0.8480 6831	0.8251 2545	0.8028 1246	0.7600 0620	66
67	0.8459 5343	0.8227 2584	0.8001 4531	0.7568 5265	67
68	0.8438 4382	0.8203 3320	0.7974 8702	0.7537 1218	68
69	0.8417 3947	0.8179 4752	0.7948 3756	0.7505 8474	69
70	0.8396 4037	0.8155 6878	0.7921 9690	0.7474 7028	70
71	0.8375 4650	0.8131 9695	0.7895 6502	0.7443 6874	71
72	0.8354 5786	0.8108 3202	0.7869 4188	0.7412 8008	72
73	0.8333 7442	0.8084 7397	0.7843 2745	0.7382 0423	73
74	0.8312 9618	0.8061 2278	0.7817 2171	0.7351 4114	74
75	0.8292 2312	0.8037 7843	0.7791 2463	0.7320 9076	75
76	0.8271 5523	0.8014 4089	0.7765 3618	0.7290 5304	76
77	0.8250 9250	0.7991 1015	0.7739 5632	0.7260 2792	77
78	0.8230 3491	0.7967 8619	0.7713 8504	0.7230 1536	78
79	0.8209 8246	0.7944 6899	0.7688 2230	0.7200 1529	79
80	0.8189 3512	0.7921 5853	0.7662 6807	0.7170 2768	80
81	0.8168 9289	0.7898 5479	0.7637 2233	0.7140 5246	81
82	0.8148 5575	0.7875 5774	0.7611 8505	0.7110 8959	82
83	0.8128 2369	0.7852 6738	0.7586 5619	0.7081 3901	83
84	0.8107 9670	0.7829 8368	0.7561 3574	0.7052 0067	84
85	0.8087 7476	0.7807 0662	0.7536 2366	0.7022 7453	85
86	0.8067 5787	0.7784 3618	0.7511 1993	0.6993 6052	86
87	0.8047 4600	0.7761 7234	0.7486 2451	0.6964 5861	87
88	0.8027 3915	0.7739 1509	0.7461 3739	0.6935 6874	88
89	0.8007 3731	0.7716 6440	0.7436 5853	0.6906 9086	89
90	0.7987 4046	0.7694 2026	0.7411 8790	0.6878 2493	90
91	0.7967 4859	0.7671 8264	0.7387 2548	0.6849 7088	91
92	0.7947 6168	0.7649 5153	0.7362 7125	0.6821 2868	92
93	0.7927 7973	0.7627 2691	0.7338 2516	0.6792 9827	93
94	0.7908 0273	0.7605 0876	0.7313 8720	0.6764 7960	94
95	0.7888 3065	0.7582 9706	0.7289 5735	0.6736 7263	95
96	0.7868 6349	0.7560 9179	0.7265 3556	0.6708 7731	96
97	0.7849 0124	0.7538 9294	0.7241 2182	0.6680 9359	97
98	0.7829 4388	0.7517 0048	0.7217 1610	0.6653 2141	98
99	0.7809 9140	0.7495 1439	0.7193 1837	0.6625 6074	99
100	0.7790 4379	0.7473 3467	0.7169 2861	0.6598 1153	100

Present Value of 1 at Compound Interest

$$v^n = (1+i)^{-n}$$

n	$\frac{1}{4}\%$	$\frac{7}{24}\%$	$\frac{1}{3}\%$	$\frac{5}{12}\%$	n
101	0.7771 0104	0.7451 6128	0.7145 4681	0.6570 7372	101
102	0.7751 6313	0.7429 9421	0.7121 7290	0.6543 4727	102
104	0.7732 3006	0.7408 3345	0.7098 0688	0.6516 3214	103
104	0.7713 0180	0.7386 7897	0.7074 4872	0.6489 2827	104
105	0.7693 7836	0.7365 3075	0.7050 9839	0.6462 3562	105
106	0.7674 5971	0.7343 8879	0.7027 5587	0.6435 5415	106
107	0.7655 4584	0.7322 5305	0.7004 2114	0.6408 8380	107
108	0.7636 3675	0.7301 2352	0.6980 9416	0.6382 2453	108
109	0.7617 3242	0.7280 0019	0.6957 7491	0.6355 7630	109
110	0.7598 3284	0.7258 8303	0.6934 6336	0.6329 3905	110
111	0.7579 3799	0.7237 7203	0.6911 5950	0.6303 1275	111
112	0.7560 4787	0.7216 6716	0.6888 6329	0.6276 9734	112
113	0.7541 6247	0.7195 6842	0.6865 7470	0.6250 9279	113
114	0.7522 8176	0.7174 7578	0.6842 9372	0.6224 9904	114
115	0.7504 0575	0.7153 8923	0.6820 2032	0.6199 1606	115
116	0.7485 3441	0.7133 0875	0.6797 5448	0.6173 4379	116
117	0.7466 6774	0.7112 3431	0.6774 9616	0.6147 8220	117
118	0.7448 0573	0.7091 6591	0.6752 4534	0.6122 3123	118
119	0.7429 4836	0.7071 0353	0.6730 0200	0.6096 9086	119
120	0.7410 9562	0.7050 4714	0.6707 6611	0.6071 6102	120
121	0.7392 4750	0.7029 9673	0.6685 3765	0.6046 4168	121
122	0.7374 0399	0.7009 5229	0.6663 1660	0.6021 3279	122
123	0.7355 6508	0.6989 1379	0.6641 0292	0.5996 3431	123
124	0.7337 3075	0.6968 8122	0.6618 9660	0.5971 4620	124
125	0.7319 0100	0.6948 5456	0.6596 9761	0.5946 6842	125
126	0.7300 7581	0.6928 3379	0.6575 0592	0.5922 0091	126
127	0.7282 5517	0.6908 1890	0.6553 2152	0.5897 4365	127
128	0.7264 3907	0.6888 0988	0.6531 4437	0.5872 9658	128
129	0.7246 2750	0.6868 0669	0.6509 7445	0.5848 5966	129
130	0.7228 2045	0.6848 0933	0.6488 1175	0.5824 3286	130
131	0.7210 1791	0.6828 1778	0.6466 5623	0.5800 1613	131
132	0.7192 1986	0.6808 3202	0.6445 0787	0.5776 0942	132
133	0.7174 2629	0.6788 5203	0.6423 6665	0.5752 1270	133
134	0.7156 3720	0.6768 7780	0.6402 3254	0.5728 2593	134
135	0.7138 5257	0.6749 0932	0.6381 0552	0.5704 4906	135
136	0.7120 7239	0.6729 4656	0.6359 8557	0.5680 8205	136
137	0.7102 9664	0.6709 8950	0.6338 7266	0.5657 2486	137
138	0.7085 2533	0.6690 3814	0.6317 6677	0.5633 7745	138
139	0.7067 5843	0.6670 9246	0.6296 6788	0.5610 3979	139
140	0.7049 9595	0.6651 5243	0.6275 7596	0.5587 1182	140
141	0.7032 3785	0.6632 1804	0.6254 9099	0.5563 9351	141
142	0.7014 8414	0.6612 8928	0.6234 1295	0.5540 8483	142
143	0.6997 3480	0.6593 6613	0.6213 4181	0.5517 8572	143
144	0.6979 8983	0.6574 4857	0.6192 7755	0.5494 9615	144
145	0.6962 4921	0.6555 3659	0.6172 2015	0.5472 1609	145
146	0.6945 1292	0.6536 3017	0.6151 6958	0.5449 4548	146
147	0.6927 8097	0.6517 2929	0.6131 2583	0.5426 8429	147
148	0.6910 5334	0.6498 3394	0.6110 8887	0.5404 3249	148
149	0.6893 3001	0.6479 4410	0.6090 5867	0 5381 9003	149
150	0.6876 1098	0.6460 5976	0.6070 3522	0 5359 5688	150

Present Value of 1 at Compound Interest

$$v^n = (1+i)^{-n}$$

n	$\frac{1}{4}\%$	$\frac{7}{24}\%$	$\frac{1}{3}\%$	$\frac{5}{12}\%$	n
151	0.6858 9624	0.6441 8090	0.6050 1849	0.5337 3299	151
152	0.6841 8578	0.6423 0750	0.6030 0847	0.5315 1833	152
153	0.6824 7958	0.6404 3956	0.6010 0512	0.5293 1286	153
154	0.6807 7764	0.6385 7704	0.5990 0842	0.5271 1654	154
155	0.6790 7994	0.6367 1994	0.5970 1836	0.5249 2934	155
156	0.6773 8647	0.6348 6824	0.5950 3491	0.5227 5121	156
157	0.6756 9723	0.6330 2193	0.5930 5805	0.5205 8211	157
158	0.6740 1220	0.6311 8098	0.5910 8776	0.5184 2202	158
159	0.6723 3137	0.6293 4539	0.5891 2401	0.5162 7089	159
160	0.6706 5473	0.6275 1514	0.5871 6679	0.5141 2869	160
161	0.6689 8228	0.6256 9021	0.5852 1607	0.5119 9538	161
162	0.6673 1399	0.6238 7058	0.5832 7183	0.5098 7091	162
163	0.6656 4987	0.6220 5625	0.5813 3405	0.5077 5527	163
164	0.6639 8989	0.6202 4720	0.5794 0271	0.5056 4840	164
165	0.6623 3406	0.6184 4341	0.5774 7778	0.5035 5027	165
166	0.6606 8235	0.6166 4486	0.5755 5925	0.5014 6085	166
167	0.6590 3476	0.6148 5154	0.5736 4710	0.4993 8010	167
168	0.6573 9129	0.6130 6344	0.5717 4129	0.4973 0798	168
169	0.6557 5191	0.6112 8054	0.5698 4182	0.4952 4447	169
170	0.6541 1661	0.6095 0282	0.5679 4866	0.4931 8951	170
171	0.6524 8540	0.6077 3027	0.5660 6178	0.4911 4308	171
172	0.6508 5826	0.6059 6288	0.5641 8118	0.4891 0514	172
173	0.6492 3517	0.6042 0063	0.5623 0682	0.4870 7566	173
174	0.6476 1613	0.6024 4350	0.5604 3870	0.4850 5460	174
175	0.6460 0112	0.6006 9149	0.5585 7677	0.4830 4192	175
176	0.6443 9015	0.5989 4456	0.5567 2104	0.4810 3760	176
177	0.6427 8319	0.5972 0272	0.5548 7147	0.4790 4159	177
178	0.6411 8024	0.5954 6595	0.5530 2804	0.4770 5387	178
179	0.6395 8129	0.5937 3422	0.5511 9074	0.4750 7439	179
180	0.6379 8632	0.5920 0753	0.5493 5954	0.4731 0313	180
181	0.6363 9533	0.5902 8586	0.5475 3442	0.4711 4005	181
182	0.6348 0831	0.5885 6920	0.5457 1537	0.4691 8511	182
183	0.6332 2525	0.5868 5754	0.5439 0237	0.4672 3828	183
184	0.6316 4613	0.5851 5085	0.5420 9538	0.4652 9953	184
185	0.6300 7096	0.5834 4912	0.5402 9440	0.4633 6883	185
186	0.6284 9971	0.5817 5234	0.5384 9940	0.4614 4614	186
187	0.6269 3238	0.5800 6050	0.5367 1037	0.4595 3142	187
188	0.6253 6895	0.5783 7357	0.5349 2728	0.4576 2465	188
189	0.6238 0943	0.5766 9156	0.5331 5011	0.4557 2580	189
190	0.6222 5380	0.5750 1443	0.5313 7885	0.4538 3482	190
191	0.6207 0204	0.5733 4218	0.5296 1347	0.4519 5168	191
192	0.6191 5416	0.5716 7480	0.5278 5396	0.4500 7637	192
193	0.6176 1013	0.5700 1226	0.5261 0029	0.4482 0883	193
194	0.6160 6996	0.5683 5456	0.5243 5245	0.4463 4904	194
195	0.6145 3362	0.5667 0168	0.5226 1041	0.4444 9697	195
196	0.6130 0112	0.5650 5361	0.5208 7417	0.4426 5258	196
197	0.6114 7244	0.5634 1033	0.5191 4369	0.4408 1585	197
198	0.6099 4757	0.5617 7183	0.5174 1896	0.4389 8674	198
199	0.6084 2650	0.5601 3809	0.5156 9996	0.4371 6522	199
200	0.6069 0923	0.5585 0911	0.5139 8667	0.4353 5125	200

Present Value of 1 at Compound Interest

$$v^n = (1+i)^{-n}$$

n	$\frac{1}{2}\%$	$\frac{7}{12}\%$	$\frac{5}{8}\%$	$\frac{2}{3}\%$	n
1	0.9950 2488	0.9942 0050	0.9937 8882	0.9933 7748	1
2	0.9900 7450	0.9884 3463	0.9876 1622	0.9867 9882	2
3	0.9851 4876	0.9827 0220	0.9814 8196	0.9802 6373	3
4	0.9802 4752	0.9770 0302	0.9753 8580	0.9737 7192	4
5	0.9753 7067	0.9713 3688	0.9693 2750	0.9673 2310	5
6	0.9705 1808	0.9657 0361	0.9633 0683	0.9609 1699	6
7	0.9656 8963	0.9601 0301	0.9573 2356	0.9545 5330	7
8	0.9608 8520	0.9545 3489	0.9513 7745	0.9482 3175	8
9	0.9561 0468	0.9489 9907	0.9454 6827	0.9419 5207	9
10	0.9513 4794	0.9434 9534	0.9395 9580	0.9357 1398	10
11	0.9466 1489	0.9380 2354	0.9337 5980	0.9295 1720	11
12	0.9419 0534	0.9325 8347	0.9279 6005	0.9233 6145	12
13	0.9372 1924	0.9271 7495	0.9221 9632	0.9172 4648	13
14	0.9325 5646	0.9217 9780	0.9164 6840	0.9111 7200	14
15	0.9279 1688	0.9164 5183	0.9107 7604	0.9051 3775	15
16	0.9233 0037	0.9111 3686	0.9051 1905	0.8991 4346	16
17	0.9187 0684	0.9058 5272	0.8994 9719	0.8931 8886	17
18	0.9141 3616	0.9005 9923	0.8939 1025	0.8872 7371	18
19	0.9095 8822	0.8953 7620	0.8883 5802	0.8813 9772	19
20	0.9050 6290	0.8901 8346	0.8828 4027	0.8755 6065	20
21	0.9005 6010	0.8850 2084	0.8773 5679	0.8697 6224	21
22	0.8960 7971	0.8798 8816	0.8719 0736	0.8640 0222	22
23	0.8916 2160	0.8747 8525	0.8664 9179	0.8582 8035	23
24	0.8871 8567	0.8697 1193	0.8611 0985	0.8525 9638	24
25	0.8827 7181	0.8646 6803	0.8557 6135	0.8469 5004	25
26	0.8783 7991	0.8596 5339	0.8504 4606	0.8413 4110	26
27	0.8740 0986	0.8546 6782	0.8451 6378	0.8357 6931	27
28	0.8696 6155	0.8497 1118	0.8399 1432	0.8302 3441	28
29	0.8653 3488	0.8447 8327	0.8346 9746	0.8247 3617	29
30	0.8610 2973	0.8398 8395	0.8295 1300	0.8192 7434	30
31	0.8567 4600	0.8350 1304	0.8243 6075	0.8138 4868	31
32	0.8524 8358	0.8301 7038	0.8192 4050	0.8084 5896	32
33	0.8482 4237	0.8253 5581	0.8141 5205	0.8031 0492	33
34	0.8440 2226	0.8205 6915	0.8090 9520	0.7977 8635	34
35	0.8398 2314	0.8158 1026	0.8040 6976	0.7925 0299	35
36	0.8356 4492	0.8110 7897	0.7990 7554	0.7872 5463	36
37	0.8314 8748	0.8063 7511	0.7941 1234	0.7820 4102	37
38	0.8273 5073	0.8016 9854	0.7891 7997	0.7768 6194	38
39	0.8232 3455	0.7970 4908	0.7842 7823	0.7717 1716	39
40	0.8191 3886	0.7924 2660	0.7794 0693	0.7666 0645	40
41	0.8150 6354	0.7878 3092	0.7745 6590	0.7615 2959	41
42	0.8110 0850	0.7832 6189	0.7697 5493	0.7564 8635	42
43	0.8069 7363	0.7787 1936	0.7649 7384	0.7514 7650	43
44	0.8029 5884	0.7742 0317	0.7602 2245	0.7464 9984	44
45	0.7989 6402	0.7697 1318	0.7555 0057	0.7415 5613	45
46	0.7949 8907	0.7652 4923	0.7508 0802	0.7366 4516	46
47	0.7910 3390	0.7608 1116	0.7461 4462	0.7317 6672	47
48	0.7870 9841	0.7563 9884	0.7415 1018	0.7269 2058	48
49	0.7831 8250	0.7520 1210	0.7369 0453	0.7221 0654	49
50	0.7792 8607	0.7476 5080	0.7323 2748	0.7173 2437	50

Present Value of 1 at Compound Interest

$$v^n = (1+i)^{-n}$$

n	$\frac{1}{2}\%$	$\frac{7}{12}\%$	$\frac{5}{8}\%$	$\frac{2}{3}\%$	n
51	0.7754 0902	0.7433 1480	0.7277 7886	0.7125 7388	51
52	0.7715 5127	0.7390 0394	0.7232 5849	0.7078 5485	52
53	0.7677 1270	0.7347 1809	0.7187 6620	0.7031 6707	53
54	0.7638 9324	0.7304 5709	0.7143 0182	0.6985 1033	54
55	0.7600 9277	0.7262 2080	0.7098 6516	0.6938 8444	55
56	0.7563 1122	0.7220 0908	0.7054 5606	0.6892 8918	56
57	0.7525 4847	0.7178 2179	0.7010 7434	0.6847 2435	57
58	0.7488 0445	0.7136 5878	0.6967 1985	0.6801 8975	58
59	0.7450 7906	0.7095 1991	0.6923 9239	0.6756 8518	59
60	0.7413 7220	0.7054 0505	0.6880 9182	0.6712 1044	60
61	0.7376 8378	0.7013 1405	0.6838 1796	0.6667 6534	61
62	0.7340 1371	0.6972 4678	0.6795 7064	0.6623 4968	62
63	0.7303 6190	0.6932 0310	0.6753 4970	0.6579 6326	63
64	0.7267 2826	0.6891 8286	0.6711 5499	0.6536 0588	64
65	0.7231 1269	0.6851 8594	0.6669 8632	0.6492 7737	65
66	0.7195 1512	0.6812 1221	0.6628 4355	0.6449 7752	66
67	0.7159 3544	0.6772 6151	0.6587 2651	0.6407 0614	67
68	0.7123 7357	0.6733 3373	0.6546 3504	0.6364 6306	68
69	0.7088 2943	0.6694 2873	0.6505 6898	0.6322 4807	69
70	0.7053 0291	0.6655 4638	0.6465 2818	0.6280 6100	70
71	0.7017 9394	0.6616 8654	0.6425 1248	0.6239 0165	71
72	0.6983 0243	0.6578 4909	0.6385 2172	0.6197 6985	72
73	0.6948 2829	0.6540 3389	0.6345 5574	0.6156 6541	73
74	0.6913 7143	0.6502 4082	0.6306 1440	0.6115 8816	74
75	0.6879 3177	0.6464 6975	0.6266 9754	0.6075 3791	75
76	0.6845 0923	0.6427 2054	0.6228 0501	0.6035 1448	76
77	0.6811 0371	0.6389 9308	0.6189 3666	0.5995 1769	77
78	0.6777 1513	0.6352 8724	0.6150 9233	0.5955 4738	78
79	0.6743 4342	0.6316 0289	0.6112 7188	0.5916 0336	79
80	0.6709 8847	0.6279 3991	0.6074 7516	0.5876 8545	80
81	0.6676 5022	0.6242 9817	0.6037 0203	0.5837 9350	81
82	0.6643 2858	0.6206 7755	0.5999 5232	0.5799 2732	82
83	0.6610 2346	0.6170 7793	0.5962 2591	0.5760 8674	83
84	0.6577 3479	0.6134 9919	0.5925 2264	0.5722 7159	84
85	0.6544 6248	0.6099 4120	0.5888 4238	0.5684 8171	85
86	0.6512 0644	0.6064 0384	0.5851 8497	0.5647 1693	86
87	0.6479 6661	0.6028 8700	0.5815 5028	0.5609 7709	87
88	0.6447 4290	0.5993 9056	0.5779 3817	0.5572 6201	88
89	0.6415 3522	0.5959 1439	0.5743 4849	0.5535 7153	89
90	0.6383 4350	0.5924 5838	0.5707 8111	0.5499 0549	90
91	0.6351 6766	0.5890 2242	0.5672 3589	0.5462 6374	91
92	0.6320 0763	0.5856 0638	0.5637 1268	0.5426 4610	92
93	0.6288 6331	0.5822 1015	0.5602 1136	0.5390 5241	93
94	0.6257 3464	0.5788 3363	0.5567 3179	0.5354 8253	94
95	0.6226 2153	0.5754 7668	0.5532 7383	0.5319 3629	95
96	0.6195 2391	0.5721 3920	0.5498 3734	0.5284 1353	96
97	0.6164 4170	0.5688 2108	0.5464 2220	0.5249 1410	97
98	0.6133 7483	0.5655 2220	0.5430 2828	0.5214 3785	98
99	0.6103 2321	0.5622 4245	0.5396 5543	0.5179 8462	99
100	0.6072 8678	0.5589 8172	0.5363 0353	0.5145 5426	100

Present Value of 1 at Compound Interest

$$v^n = (1+i)^{-n}$$

n	$\frac{1}{2}\%$	$\frac{7}{12}\%$	$\frac{5}{8}\%$	$\frac{2}{3}\%$	n
101	0.6042 6545	0.5557 3991	0.5329 7246	0.5111 4660	101
102	0.6012 5915	0.5525 1689	0.5296 6207	0.5077 6152	102
103	0.5982 6781	0.5493 1257	0.5263 7225	0.5043 9886	103
104	0.5952 9136	0.5461 2683	0.5231 0285	0.5010 5847	104
105	0.5923 2971	0.5429 5957	0.5198 5377	0.4977 4020	105
106	0.5893 8279	0.5398 1067	0.5166 2486	0.4944 4391	106
107	0.5864 5054	0.5366 8004	0.5134 1601	0.4911 6945	107
108	0.5835 3288	0.5335 6756	0.5102 2709	0.4879 1667	108
109	0.5806 2973	0.5304 7313	0.5070 5798	0.4846 8543	109
110	0.5777 4102	0.5273 9665	0.5039 0855	0.4814 7559	110
111	0.5748 6669	0.5243 3801	0.5007 7868	0.4782 8701	111
112	0.5720 0666	0.5212 9711	0.4976 6826	0.4751 1955	112
113	0.5691 6085	0.5182 7385	0.4945 7715	0.4719 7306	113
114	0.5663 2921	0.5152 6812	0.4915 0524	0.4688 4741	114
115	0.5635 1165	0.5122 7982	0.4884 5242	0.4657 4246	115
116	0.5607 0811	0.5093 0885	0.4854 1855	0.4626 5808	116
117	0.5579 1852	0.5063 5512	0.4824 0353	0.4595 9411	117
118	0.5551 4280	0.5034 1851	0.4794 0723	0.4565 5044	118
119	0.5523 8090	0.5004 9893	0.4764 2955	0.4535 2693	119
120	0.5496 3273	0.4975 9629	0.4734 7036	0.4505 2344	120
121	0.5468 9824	0.4947 1047	0.4705 2955	0.4475 3984	121
122	0.5441 7736	0.4918 4140	0.4676 0700	0.4445 7600	122
123	0.5414 7001	0.4889 8896	0.4647 0261	0.4416 3179	123
124	0.5387 7612	0.4861 5307	0.4618 1626	0.4387 0708	124
125	0.5360 9565	0.4833 3363	0.4589 4784	0.4358 0173	125
126	0.5334 2850	0.4805 3053	0.4560 9723	0.4329 1563	126
127	0.5307 7463	0.4777 4369	0.4532 6433	0.4300 4864	127
128	0.5281 3396	0.4749 7302	0.4504 4902	0.4272 0063	128
129	0.5255 0643	0.4722 1841	0.4476 5120	0.4243 7149	129
130	0.5228 9197	0.4694 7978	0.4448 7076	0.4215 6108	130
131	0.5202 9052	0.4667 5703	0.4421 0759	0.4187 6929	131
132	0.5177 0201	0.4640 5007	0.4393 6158	0.4159 9598	132
133	0.5151 2637	0.4613 5881	0.4366 3262	0.4132 4104	133
134	0.5125 6356	0.4586 8316	0.4339 2062	0.4105 0434	134
135	0.5100 1349	0.4560 2303	0.4312 2546	0.4077 8577	135
136	0.5074 7611	0.4533 7832	0.4285 4704	0.4050 8520	136
137	0.5049 5135	0.4507 4895	0.4258 8526	0.4024 0252	137
138	0.5024 3916	0.4481 3483	0.4232 4001	0.3997 3760	138
139	0.4999 3946	0.4455 3587	0.4206 1119	0.3970 9033	139
140	0.4974 5220	0.4429 5198	0.4179 9870	0.3944 6059	140
141	0.4949 7731	0.4403 8308	0.4154 0243	0.3918 4827	141
142	0.4925 1474	0.4378 2908	0.4128 2229	0.3892 5325	142
143	0.4900 6442	0.4352 8989	0.4102 5818	0.3866 7541	143
144	0.4876 2628	0.4327 6542	0.4077 0999	0.3841 1465	144
145	0.4852 0028	0.4302 5560	0.4051 7763	0.3815 7084	145
146	0.4827 8635	0.4277 6033	0.4026 6100	0.3790 4389	146
147	0.4803 8443	0.4252 7953	0.4001 6000	0.3765 3366	147
148	0.4779 9446	0.4228 1312	0.3976 7453	0.3740 4006	148
149	0.4756 1637	0.4203 6102	0.3952 0451	0.3715 6297	159
150	0.4732 5012	0.4179 2313	0.3927 4982	0.3691 0229	150

Present Value of 1 at Compound Interest

$$v^n = (1+i)^{-n}$$

n	$\frac{1}{2}\%$	$\frac{7}{12}\%$	$\frac{5}{8}\%$	$\frac{2}{3}\%$	n
151	0.4708 9565	0.4154 9939	0.3903 1038	0.3666 5791	151
152	0.4685 5288	0.4130 8970	0.3878 8609	0.3642 2971	152
153	0.4662 2177	0.4106 9398	0.3854 7686	0.3618 1759	153
154	0.4639 0226	0.4083 1216	0.3830 8259	0.3594 2145	154
155	0.4615 9429	0.4059 4416	0.3807 0320	0.3570 4117	155
156	0,4592 9780	0.4035 8988	0.3783 3858	0.3546 7666	156
157	0.4570 1274	0.4012 4926	0.3759 8865	0.3523 2781	157
158	0.4547 3904	0.3989 2221	0.3736 5332	0.3499 9451	158
159	0.4524 7666	0.3966 0866	0.3713 3249	0.3476 7667	159
160	0.4502 2553	0.3943 0853	0.3690 2608	0.3453 7417	160
161	0.4479 8560	0.3920 2174	0.3667 3399	0.3430 8693	161
162	0.4457 5682	0.3897 4821	0.3644 5614	0.3408 1483	162
163	0.4435 3912	0.3874 8786	0.3621 9244	0.3385 5778	163
164	0.4413 3246	0.3852 4062	0.3599 4280	0.3363 1567	164
165	0.4391 3678	0.3830 0642	0.3577 0713	0.3340 8841	165
166	0.4369 5202	0.3807 8517	0.3554 8534	0.3318 7591	166
167	0.4347 7813	0.3785 7681	0.3532 7736	0.3296 7805	167
168	0.4326 1505	0.3763 8125	0.3510 8309	0.3274 9476	168
169	0.4304 6274	0.3741 9843	0.3489 0245	0.3253 2592	169
170	0.4283 2113	0.3720 2826	0.3467 3535	0.3231 7144	170
171	0.4261 9018	0.3698 7068	0.3445 8172	0.3210 3123	171
172	0.4240 6983	0.3677 2562	0.3424 4146	0.3189 0520	172
173	0.4219 6003	0.3655 9299	0.3403 1449	0.3167 9324	173
174	0.4198 6073	0.3634 7273	0.3382 0074	0.3146 9527	174
175	0.4177 7187	0.3613 6477	0.3361 0011	0.3126 1120	175
176	0.4156 9340	0.3592 6904	0.3340 1254	0.3105 4093	176
177	0.4136 2528	0.3571 8546	0.3319 3792	0.3084 8436	177
178	0.4115 6744	0.3551 1396	0.3298 7620	0.3064 4142	178
179	0.4095 1984	0.3530 5447	0.3278 2728	0.3044 1201	179
180	0.4074 8243	0.3510 0693	0.3257 9108	0.3023 9603	180
181	0.4054 5515	0.3489 7127	0.3237 6754	0.3003 9341	181
182	0.4034 3796	0.3469 4741	0.3217 5656	0.2984 0405	182
183	0.4014 3081	0.3449 3529	0.3197 5807	0.2964 2786	183
184	0.3994 3364	0.3429 3483	0.3177 7199	0.2944 6477	184
185	0.3974 4641	0.3409 4598	0.3157 9825	0.2925 1467	185
186	0.3954 6906	0.3389 6866	0.3138 3677	0.2905 7748	186
187	0.3935 0155	0.3370 0281	0.3118 8748	0.2886 5313	187
188	0.3915 4383	0.3350 4837	0.3099 5029	0.2867 4152	188
189	0.3895 9586	0.3331 0525	0.3080 2513	0.2848 4257	189
190	0.3876 5757	0.3311 7341	0.3061 1193	0.2829 5619	190
191	0.3857 2892	0.3292 5277	0.3042 1062	0.2810 8231	191
192	0.3838 0987	0.3273 4326	0.3023 2111	0.2792 2084	192
193	0.3819 0037	0.3254 4484	0.3004 4334	0.2773 7170	193
194	0.3800 0037	0.3235 5742	0.2985 7723	0.2755 3480	194
195	0.3781 0982	0.3216 8095	0.2967 2271	0.2737 1006	195
196	0.3762 2868	0.3198 1536	0.2948 7972	0.2718 9741	196
197	0.3743 5689	0.3179 6059	0.2930 4816	0.2700 9677	197
198	0.3724 9442	0.3161 1657	0.2912 2799	0.2683 0805	198
199	0.3706 4121	0.3142 8325	0.2894 1912	0.2665 3117	199
200	0.3687 9723	0.3124 6057	0.2876 2149	0.2647 6607	200

Present Value of 1 at Compound Interest

$$v^n = (1+i)^{-n}$$

n	¾%	⅞%	1%	1⅛%	n
1	0.9925 5583	0.9913 2590	0.9900 9901	0.9888 7515	1
2	0.9851 6708	0.9827 2704	0.9802 9605	0.9778 7407	2
3	0.9778 3333	0.9742 0276	0.9705 9015	0.9669 9537	3
4	0.9705 5417	0.9657 5243	0.9609 8034	0.9562 3770	4
5	0.9633 2920	0.9573 7539	0.9514 6569	0.9455 9970	5
6	0.9561 5802	0.9490 7102	0.9420 4524	0.9350 8005	6
7	0.9490 4022	0.9408 3868	0.9327 1805	0.9246 7743	7
8	0.941 7540	0.9326 7775	0.9234 8322	0.9143 9054	8
9	0.9349 6318	0.9245 8761	0.9143 3982	0.9042 1808	9
10	0.9280 0315	0.9165 6765	0.9052 8695	0.8941 5881	10
11	0.9210 9494	0.9086 1724	0.8963 2372	0.8842 1142	11
12	0.9142 3815	0.9007 3581	0.8874 4923	0.8743 7470	12
13	0.9074 3241	0.8929 2273	0.8786 6260	0.8646 4742	13
14	0.9006 7733	0.8851 7743	0.8699 6297	0.8550 2835	14
15	0.8939 7254	0.8774 9931	0.8613 4947	0.8455 1629	15
16	0.8873 1766	0.8698 8779	0.8528 2126	0.8361 1005	16
17	0.8807 1231	0.8623 4230	0.8443 7749	0.8268 0846	17
18	0.8741 5614	0.8548 6225	0.8360 1731	0.8176 1034	18
19	0.8676 4878	0.8474 4709	0.8277 3992	0.8085 1455	19
20	0.8611 8985	0.8400 9624	0.8195 4447	0.7995 1995	20
21	0.8547 7901	0.8328 0917	0.8114 3017	0.7906 2542	21
22	0.8484 1589	0.8255 8530	0.8033 9621	0.7818 2983	22
23	0.8421 0014	0.8184 2409	0.7954 4179	0.7731 3210	23
24	0.8358 3140	0.8113 2499	0.7875 6613	0.7645 3112	24
25	0.8296 0933	0.8042 8748	0.7797 6844	0.7560 2583	25
26	0.8234 3358	0.7973 1101	0.7720 4796	0.7476 1516	26
27	0.8173 0380	0.7903 9505	0.7644 0392	0.7392 9806	27
28	0.8112 1966	0.7835 3908	0.7568 3557	0.7310 7348	28
29	0.8051 8080	0.7767 4258	0.7493 4215	0.7229 4040	29
30	0.7991 8690	0.7700 0504	0.7419 2292	0.7148 9780	30
31	0.7932 3762	0.7633 2594	0.7345 7715	0.7069 4467	31
32	0.7873 3262	0.7567 0477	0.7273 0411	0.6990 8002	32
33	0.7814 7158	0.7501 4104	0.7201 0307	0.6913 0287	33
34	0.7756 5418	0.7436 3424	0.7129 7334	0.6836 1223	34
35	0.7698 8008	0.7371 8388	0.7059 1420	0.6760 0715	35
36	0.7641 4896	0.7307 8947	0.6989 2495	0.6684 8667	36
37	0.7584 6051	0.7244 5053	0.6920 0490	0.6610 4986	37
38	0.7528 1440	0.7181 6657	0.6851 5337	0.6536 9578	38
39	0.7472 1032	0.7119 3712	0.6783 6967	0.6464 2352	39
40	0.7416 4796	0.7057 6171	0.6716 5314	0.6392 3216	40
41	0.7361 2701	0.6996 3986	0.6650 0311	0.6321 2080	41
42	0.7306 4716	0.6935 7111	0.6584 1892	0.6250 8855	42
43	0.7252 0809	0.6875 5500	0.6518 9992	0.6181 3454	43
44	0.7198 0952	0.6815 9108	0.6454 4546	0.6112 5789	44
45	0.7144 5114	0.6756 7889	0.6390 5492	0.6044 5774	45
46	0.7091 3264	0.6698 1798	0.6327 2764	0.5977 3324	46
47	0.7038 5374	0.6640 0792	0.6264 6301	0.5910 8355	47
48	0.6986 1414	0.6582 4824	0.6202 6041	0.5845 0784	48
49	0.6934 1353	0.6525 3853	0.6141 1921	0.5780 0528	49
50	0.6882 5165	0.6468 7835	0.6080 3882	0.5715 7506	50

Present Value of 1 at Compound Interest

$$v^n = (1+i)^{-n}$$

n	¾%	⅞%	1%	1⅛%	n
51	0.6831 2819	0.6412 6726	0.6020 1864	0.5652 1637	51
52	0.6780 4286	0.6357 0484	0.5960 5806	0.5589 2843	52
53	0.6729 9540	0.6301 9067	0.5901 5649	0.5527 1044	53
54	0.6679 8551	0.6247 2433	0.5843 1336	0.5465 6162	54
55	0.6630 1291	0.6193 0541	0.5785 2808	0.5404 8120	55
56	0.6580 7733	0.6139 3349	0.5728 0008	0.5344 6843	56
57	0.6531 7849	0.6086 0817	0.5671 2879	0.5285 2256	57
58	0.6483 1612	0.6033 2904	0.5615 1365	0.5226 4282	58
59	0.6434 8995	0.5980 9571	0.5559 5411	0.5168 2850	59
60	0.6386 9970	0.5929 0776	0.5504 4962	0.5110 7887	60
61	0.6339 4511	0.5877 6482	0.5449 9962	0.5053 9319	61
62	0.6292 2592	0.5826 6649	0.5396 0358	0.4997 7077	62
63	0.6245 4185	0.5776 1238	0.5342 6097	0.4942 1090	63
64	0.6198 9266	0.5726 0211	0.5289 7126	0.4887 1288	64
65	0.6152 7807	0.5676 3530	0.5237 3392	0.4832 7602	65
66	0.6106 9784	0.5627 1158	0.5185 4844	0.4778 9965	66
67	0.6061 5170	0.5578 3056	0.5134 1429	0.4725 8309	67
68	0.6016 3940	0.5529 9188	0.5083 3099	0.4673 2568	68
69	0.5971 6070	0.5481 9517	0.5032 9801	0.4621 2675	69
70	0.5927 1533	0.5434 4007	0.4983 1486	0.4569 8566	70
71	0.5883 0306	0.5387 2622	0.4933 8105	0.4519 0177	71
72	0.5839 2363	0.5340 5325	0.4884 9609	0.4468 7443	72
73	0.5795 7681	0.5294 2082	0.4836 5949	0.4419 0302	73
74	0.5752 6234	0.5248 2857	0.4788 7078	0.4369 8692	74
75	0.5709 7999	0.5202 7615	0.4741 2949	0.4321 2551	75
76	0.5667 2952	0.5157 6322	0.4694 3514	0.4273 1818	76
77	0.5625 1069	0.5112 8944	0.4647 8726	0.4225 6433	77
78	0.5583 2326	0.5068 5447	0.4601 8541	0.4178 6337	78
79	0.5541 6701	0.5024 5796	0.4556 2912	0.4132 1470	79
80	0.5500 4170	0.4980 9959	0.4511 1794	0.4086 1775	80
81	0.5459 4710	0.4937 7902	0.4466 5142	0.4040 7194	81
82	0.5418 8297	0.4894 9593	0.4422 2913	0.3995 7670	82
83	0.5378 4911	0.4852 4999	0.4378 5063	0.3951 3148	83
84	0.5338 4527	0.4810 4089	0.4335 1547	0.3907 3570	84
85	0.5298 7123	0.4768 6829	0.4292 2324	0.3863 8882	85
86	0.5259 2678	0.4727 3188	0.4249 7350	0.3820 9031	86
87	0.5220 1169	0.4686 3136	0.4207 6585	0.3778 3961	87
88	0.5181 2575	0.4645 6640	0.4165 9985	0.3736 3621	88
89	0.5142 6873	0.4605 3671	0.4124 7510	0.3694 7956	89
90	0.5104 4043	0.4565 4197	0.4083 9119	0.3653 6916	90
91	0.5066 4063	0.4525 8187	0.4043 4771	0.3613 0448	91
92	0.5028 6911	0.4486 5613	0.4003 4427	0.3572 8503	92
93	0.4991 2567	0.4447 6444	0.3963 8046	0.3533 1029	93
94	0.4954 1009	0.4409 0651	0.3924 5590	0.3493 7976	94
95	0.4917 2217	0.4370 8204	0.3885 7020	0.3454 9297	95
96	0.4880 6171	0.4332 9075	0.3847 2297	0.3416 4941	96
97	0.4844 2850	0.4295 3234	0.3809 1383	0.3378 4861	97
98	0.4808 2233	0.4258 0654	0.3771 4241	0.3340 9010	98
99	0.4772 4301	0.4221 1305	0.3734 0832	0.3303 7340	99
100	0.4736 9033	0.4184 5159	0.3697 1121	0.3266 9805	100

Present Value of 1 at Compound Interest

$$v^n = (1+i)^{-n}$$

n	¾%	⅞%	1%	1⅛%	n
101	0.4701 6410	0.4148 2190	0.3660 5071	0.3230 6358	101
102	0.4666 6412	0.4112 2370	0.3624 2644	0.3194 6955	102
103	0.4631 9019	0.4076 5670	0.3588 3806	0.3159 1550	103
104	0.4597 4213	0.4041 2064	0.3552 8521	0.3124 0099	104
105	0.4563 1973	0.4006 1526	0.3517 6753	0.3089 2558	105
106	0.4529 2281	0.3971 4028	0.3482 8469	0.3054 8883	106
107	0.4495 5117	0.3936 9545	0.3448 3632	0.3020 9031	107
108	0.4462 0464	0.3902 8049	0.3414 2210	0.2987 2960	108
109	0.4428 8302	0.3868 9516	0.3380 4168	0.2954 0628	109
110	0.4395 8612	0.3835 3919	0.3346 9474	0.2921 1993	110
111	0.4363 1377	0.3802 1233	0.3213 8093	0.2888 7014	111
112	0.4330 6577	0.3769 1433	0.3280 9993	0.2856 5651	112
113	0.4298 4196	0.3736 4494	0.3248 5141	0.2824 7862	113
114	0.4266 4124	0.3704 0391	0.3216 3506	0.2793 3609	114
115	0.4234 6615	0.3671 9099	0.3184 5056	0.2762 2852	115
116	0.4203 1379	0.3640 0593	0.3152 9758	0.2731 5552	116
117	0.4171 8491	0.3608 4851	0.3121 7582	0.2701 1671	117
118	0.4140 7931	0.3577 1847	0.3090 8497	0.2671 1170	118
119	0.4109 9683	0.3546 1559	0.3060 2473	0.2641 4013	119
120	0.4079 3730	0.3515 3961	0.3029 9478	0.2612 0161	120
121	0.4049 0055	0.3484 9032	0.2999 9483	0.2582 9578	121
122	0.4018 8640	0.3454 6748	0.2970 2459	0.2554 2228	122
123	0.3988 9469	0.3424 7086	0.2940 8375	0.2525 8075	123
124	0.3959 2525	0.3395 0024	0.2911 7203	0.2497 7082	124
125	0.3929 7792	0.3365 5538	0.2882 8914	0.2469 9216	125
126	0.3900 5252	0.3336 3606	0.2854 3479	0.2442 4441	126
127	0.3871 4891	0.3307 4207	0.2826 0870	0.2415 2723	127
128	0.3842 6691	0.3278 7318	0.2798 1060	0.2388 4028	128
129	0.3814 0636	0.3250 2917	0.2770 4019	0.2361 8322	129
130	0.3785 6711	0.3222 0984	0.2742 9722	0.2335 5572	130
131	0.3757 4899	0.3194 1496	0.2715 8141	0.2309 5744	131
132	0.3729 5185	0.3166 4432	0.2688 9248	0.2283 8808	132
133	0.3701 7553	0.3138 9771	0.2662 3018	0.2258 4730	133
134	0.3674 1988	0.3111 7493	0.2635 9424	0.2233 3478	134
135	0.3646 8475	0.3084 7577	0.2609 8439	0.2208 5021	135
136	0.3619 6997	0.3058 0002	0.2584 0039	0.2183 9329	136
137	0.3592 7541	0.3031 4748	0.2558 4197	0.2159 6370	137
138	0.3566 0090	0.3005 1795	0.2533 0888	0.2135 6114	138
139	0.3539 4630	0.2979 1122	0.2508 0087	0.2111 8530	139
140	0.3513 1147	0.2953 2711	0.2483 1770	0.2088 3590	140
141	0.3486 9625	0.2927 6541	0.2458 5911	0.2065 1263	141
142	0.3461 0049	0.2902 2594	0.2434 2486	0.2042 1521	142
143	0.3435 2406	0.2877 0849	0.2410 1471	0.2019 4335	143
144	0.3409 6681	0.2852 1288	0.2386 2843	0.1996 9676	144
145	0.3384 2860	0.2827 3891	0.2362 6577	0.1974 7516	145
146	0.3359 0928	0.2802 8640	0.2339 2650	0.1952 7828	146
147	0.3334 0871	0.2778 5517	0.2316 1040	0.1931 6584	147
148	0.3309 2676	0.2754 4503	0.2293 1723	0.1909 5757	148
149	0.3284 6329	0.2730 5579	0.2270 4676	0.1888 3320	149
150	0.3260 1815	0.2706 8728	0.2247 9877	0.1867 3245	150

Present Value of 1 at Compound Interest

$$v^n = (1+i)^{-n}$$

n	¾%	⅞%	1%	1⅛%	n
151	0.3235 9122	0.2683 3931	0.2225 7304	0.1846 5509	151
152	0.3211 8235	0.2660 1170	0.2203 6935	0.1826 0083	152
153	0.3187 9141	0.2637 0429	0.2181 8747	0.1805 6942	153
154	0.3164 1828	0.2614 1689	0.2160 2720	0.1785 6061	154
155	0.3140 6280	0.2591 4934	0.2138 8832	0.1765 7415	155
156	0.3117 2487	0.2569 0145	0.2117 7061	0.1746 0979	156
157	0.3094 0434	0.2546 7306	0.2096 7387	0.1726 6729	157
158	0.3071 0108	0.2524 6400	0.2075 9789	0.1707 4639	158
159	0.3048 1496	0.2502 7410	0.2055 4247	0.1688 4686	159
160	0.3025 4587	0.2481 0320	0.2035 0739	0.1669 6847	160
161	0.3002 9367	0.2459 5113	0.2014 9247	0.1651 1097	161
162	0.2980 5823	0.2438 1772	0.1994 9750	0.1632 7413	162
163	0.2958 3944	0.2417 0282	0.1975 2227	0.1614 5774	163
164	0.2936 3716	0.2396 0627	0.1955 6661	0.1596 6154	164
165	0.2914 5127	0.2375 2790	0.1936 3030	0.1578 8533	165
166	0.2892 8166	0.2354 6756	0.1917 1317	0.1561 2888	166
167	0.2871 2820	0.2334 2509	0.1898 1502	0.1543 9197	167
168	0.2849 9077	0.2314 0033	0.1879 3566	0.1526 7439	168
169	0.2828 6925	0.2293 9314	0.1860 7492	0.1509 7591	169
170	0.2807 6352	0.2274 0336	0.1842 3259	0.1492 9632	170
171	0.2786 7347	0.2254 3084	0.1824 0850	0.1476 3543	171
172	0.2765 9898	0.2234 7543	0.1806 0248	0.1459 9300	172
173	0.2745 3993	0.2215 3699	0.1788 1434	0.1443 6885	173
174	0.2724 9621	0.2196 1535	0.1770 4390	0.1427 6277	174
175	0.2704 6770	0.2177 1039	0.1752 9099	0.1411 7456	175
176	0.2684 5429	0.2158 2194	0.1735 5543	0.1396 0401	176
177	0.2664 5587	0.2139 4988	0.1718 3706	0.1380 5094	177
178	0.2644 7233	0.2120 9406	0.1701 3571	0.1365 1515	178
179	0.2625 0355	0.2102 5433	0.1684 5119	0.1349 9644	179
180	0.2605 4943	0.2084 3057	0.1667 8336	0.1334 9462	180
181	0.2586 0986	0.2066 2262	0.1651 3204	0.1320 0951	181
182	0.2566 8472	0.2048 3035	0.1634 9707	0.1305 4093	182
183	0.2547 7392	0.2030 5363	0.1618 7829	0.1290 8868	183
184	0.2528 7734	0.2012 9233	0.1602 7553	0.1276 5259	184
185	0.2509 9488	0.1995 4630	0.1586 8864	0.1262 3247	185
186	0.2491 2643	0.1978 1541	0.1571 1747	0.1248 2816	186
187	0.2472 7189	0.1960 9954	0.1555 6185	0.1234 3946	187
188	0.2454 3116	0.1943 9855	0.1540 2163	0.1220 6622	188
189	0.2436 0413	0.1927 1232	0.1524 9667	0.1207 0825	189
190	0.2417 9070	0.1910 4071	0.1509 8680	0.1193 6539	190
191	0.2399 9077	0.1893 8361	0.1494 9188	0.1180 3747	191
192	0.2382 0423	0.1877 4087	0.1480 1176	0.1167 2432	192
193	0.2364 3100	0.1861 1239	0.1465 4630	0.1154 2578	193
194	0.2346 7097	0.1844 9803	0.1450 9535	0.1141 4169	194
195	0.2329 2404	0.1828 9768	0.1436 5876	0.1128 7188	195
196	0.2311 9011	0.1813 1121	0.1422 3640	0.1116 1620	196
197	0.2294 6909	0.1797 3849	0.1408 2811	0.1103 7448	197
198	0.2277 6089	0.1781 7942	0.1394 3378	0.1091 4658	198
199	0.2260 6540	0.1766 3388	0.1380 5324	0.1079 3234	199
200	0.2243 8253	0.1751 0174	0.1366 8638	0.1067 3161	200

Present Value of 1 at Compound Interest

$$v^n = (1+i)^{-n}$$

n	1¼%	1⅜%	1½%	1¾%	n
1	0.9876 5432	0.9864 3650	0.9852 2167	0.9828 0098	1
2	0.9754 6106	0.9730 5696	0.9706 6175	0.9658 9777	2
3	0.9634 1833	0.9598 5890	0.9563 1699	0.9492 8528	3
4	0.9515 2428	0.9468 3986	0.9421 8423	0.9329 5851	4
5	0.9397 7706	0.9339 9739	0.9282 6033	0.9169 1254	5
6	0.9281 7488	0.9213 2912	0.9145 4219	0.9011 4254	6
7	0.9167 1593	0.9088 3267	0.9010 2679	0.8856 4378	7
8	0.9053 9845	0.8965 0571	0.8877 1112	0.8704 1157	8
9	0.8942 2069	0.8843 4596	0.8745 9224	0.8554 4135	9
10	0.8831 8093	0.8723 5113	0.8616 6723	0.8407 2860	10
11	0.8722 7746	0.8605 1899	0.8489 3323	0.8262 6889	11
12	0.8615 0860	0.8488 4734	0.8363 8742	0.8120 5788	12
13	0.8508 7269	0.8373 3400	0.8240 2702	0.7980 9128	13
14	0.8403 6809	0.8259 7682	0.8118 4928	0.7843 6490	14
15	0.8299 9318	0.8147 7368	0.7998 5150	0.7708 7459	15
16	0.8197 4635	0.8037 2250	0.7880 3104	0.7576 1631	16
17	0.8096 2602	0.7928 2120	0.7763 8526	0.7445 8605	17
18	0.7996 3064	0.7820 6777	0.7649 1159	0.7317 7990	18
19	0.7897 5866	0.7714 6020	0.7536 0747	0.7191 9401	19
20	0.7800 0855	0.7609 9649	0.7424 7042	0.7068 2458	20
21	0.7703 7881	0.7506 7472	0.7314 9795	0.6946 6789	21
22	0.7608 6796	0.7404 9294	0.7206 8763	0.6827 2028	22
23	0.7514 7453	0.7304 4926	0.7100 3708	0.6709 7817	23
24	0.7421 9707	0.7205 4181	0.6995 4392	0.6594 3800	24
25	0.7330 3414	0.7107 6874	0.6892 0583	0.6480 9632	25
26	0.7239 8434	0.7011 2823	0.6790 2052	0.6369 4970	26
27	0.7150 4626	0.6916 1847	0.6689 8574	0.6259 9479	27
28	0.7062 1853	0.6822 3771	0.6590 9925	0.6152 2829	28
29	0.6974 9978	0.6729 8417	0.6493 5887	0.6046 4697	29
30	0.6888 8867	0.6638 5615	0.6397 6243	0.5942 4764	30
31	0.6803 8387	0.6548 5194	0.6303 0781	0.5840 2716	31
32	0.6719 8407	0.6459 6985	0.6209 9292	0.5739 8247	32
33	0.6636 8797	0.6372 0824	0.6118 1568	0.5641 1053	33
34	0.6554 9429	0.6285 6546	0.6027 7407	0.5544 0839	34
35	0.6474 0177	0.6200 3991	0.5938 6608	0.5448 7311	35
36	0.6394 0916	0.6116 3000	0.5850 8974	0.5355 0183	36
37	0.6315 1522	0.6033 3416	0.5764 4309	0.5262 9172	37
38	0.6237 1873	0.5951 5083	0.5679 2423	0.5172 4002	38
39	0.6160 1850	0.5870 7850	0.5595 3126	0.5083 4400	39
40	0.6084 1334	0.5791 1566	0.5512 6232	0.4996 0098	40
41	0.6009 0206	0.5712 6083	0.5431 1559	0.4910 0834	41
42	0.5934 8352	0.5635 1253	0.5350 8925	0.4825 6348	42
43	0.5861 5656	0.5558 6933	0.5271 8153	0.4742 6386	43
44	0.5789 2006	0.5483 2979	0.5193 9067	0.4661 0699	44
45	0.5717 7290	0.5408 9252	0.5117 1494	0.4580 9040	45
46	0.5647 1397	0.5335 5612	0.5041 5265	0.4502 1170	46
47	0.5577 4219	0.5263 1923	0.4967 0212	0.4424 6850	47
48	0.5508 5649	0.5191 8050	0.4893 6170	0.4348 5848	48
49	0.5440 5579	0.5121 3860	0.4821 2975	0.4273 7934	49
50	0.5373 3905	0.5051 9220	0.4750 0468	0.4200 2883	50

Present Value of 1 at Compound Interest

$$v^n = (1+i)^{-n}$$

n	1¼%	1⅜%	1½%	1¾%	n
51	0.5307 0524	0.4983 4003	0.4679 8491	0.4128 0475	51
52	0.5241 5332	0.4915 8079	0.4610 6887	0.4057 0492	52
53	0.5176 8229	0.4849 1323	0.4542 5505	0.3987 2719	53
54	0.5112 9115	0.4783 3611	0.4475 4192	0.3918 6947	54
55	0.5049 7892	0.4718 4820	0.4409 2800	0.3851 2970	55
56	0.4987 4461	0.4654 4829	0.4344 1182	0.3785 0585	56
57	0.4925 8727	0.4591 3518	0.4279 9194	0.3719 9592	57
58	0.4865 0594	0.4529 0770	0.4216 6694	0.3655 9796	58
59	0.4804 9970	0.4467 6468	0.4154 3541	0.3593 1003	59
60	0.4745 6760	0.4407 0499	0.4092 9597	0.3531 3025	60
61	0.4687 0874	0.4347 2749	0.4032 4726	0.3470 5676	61
62	0.4629 2222	0.4288 3106	0.3972 8794	0.3410 8772	62
63	0.4572 0713	0.4230 1461	0.3914 1669	0.3352 2135	63
64	0.4515 6259	0.4172 7705	0.3856 3221	0.3294 5587	64
65	0.4459 8775	0.4116 1731	0.3799 3321	0.3237 8956	65
66	0.4404 8173	0.4060 3434	0.3743 1843	0.3182 2069	66
67	0.4350 4368	0.4005 2709	0.3687 8663	0.3127 4761	67
68	0.4296 7277	0.3950 9454	0.3633 3658	0.3073 6866	68
69	0.4243 6817	0.3897 3568	0.3579 6708	0.3020 8222	69
70	0.4191 2905	0.3844 4949	0.3526 7692	0.2968 8670	70
71	0.4139 5462	0.3792 3501	0.3474 6495	0.2917 8054	71
72	0.4088 4407	0.3740 9126	0.3423 3000	0.2867 6221	72
73	0.4037 9661	0.3690 1727	0.3372 7093	0.2818 3018	73
74	0.3988 1147	0.3640 1210	0.3322 8663	0.2769 8298	74
75	0.3938 8787	0.3590 7483	0.3273 7599	0.2722 1914	75
76	0.3890 2506	0.3542 0451	0.3225 3793	0.2675 3724	76
77	0.3842 2228	0.3494 0026	0.3177 7136	0.2629 3586	77
78	0.3794 7879	0.3446 6117	0.3130 7523	0.2584 1362	78
79	0.3747 9387	0.3399 8636	0.3084 4850	0.2539 6916	79
80	0.3701 6679	0.3353 7495	0.3038 9015	0.2496 0114	80
81	0.3655 9683	0.3308 2609	0.2993 9916	0.2453 0825	81
82	0.3610 8329	0.3263 3893	0.2949 7454	0.2410 8919	82
83	0.3566 2547	0.3219 1263	0.2906 1531	0.2369 4269	83
84	0.3522 2268	0.3175 4637	0.2863 2050	0.2328 6751	84
85	0.3478 7426	0.3132 3933	0.2820 8917	0.2288 6242	85
86	0.3435 7951	0.3089 9071	0.2779 2036	0.2249 2621	86
87	0.3393 3779	0.3047 9971	0.2738 1316	0.2210 5770	87
88	0.3351 4843	0.3006 6556	0.2697 6666	0.2172 5572	88
89	0.3310 1080	0.2965 8748	0.2657 7997	0.2135 1914	89
90	0.3269 2425	0.2925 6472	0.2618 5218	0.2098 4682	90
91	0.3228 8814	0.2885 9652	0.2579 8245	0.2062 3766	91
92	0.3189 0187	0.2846 8214	0.2541 6990	0.2026 9057	92
93	0.3149 6481	0.2808 2085	0.2504 1369	0.1992 0450	93
94	0.3110 7636	0.2770 1194	0.2467 1300	0.1957 7837	94
95	0.3072 3591	0.2732 5468	0.2430 6699	0.1924 1118	95
96	0.3034 4287	0.2695 4839	0.2394 7487	0.1891 0190	96
97	0.2996 9666	0.2658 9237	0.2359 3583	0.1858 4953	97
98	0.2959 9670	0.2622 8594	0.2324 4909	0.1826 5310	98
99	0.2923 4242	0.2587 2843	0.2290 1389	0.1795 1165	99
100	0.2887 3326	0.2552 1916	0.2256 2944	0.1764 2422	100

Present Value of 1 at Compound Interest

$$v^n = (1+i)^{-n}$$

n	2%	2¼%	2½%	2¾%	n
1	0.9803 9216	0.9779 9511	0.9756 0976	0.9732 3601	1
2	0.9611 6878	0.9564 7444	0.9518 1440	0.9471 8833	2
3	0.9423 2233	0.9354 2732	0.9285 9941	0.9218 3779	3
4	0.9238 4543	0.9148 4335	0.9059 5064	0.8971 6573	4
5	0.9057 3081	0.8947 1232	0.8838 5429	0.8731 5400	5
6	0.8879 7138	0.8750 2427	0.8622 9687	0.8497 8491	6
7	0.8705 6018	0.8557 6946	0.8412 6524	0.8270 4128	7
8	0.8534 9037	0.8369 3835	0.8207 4657	0.8049 0635	8
9	0.8367 5527	0.8185 2161	0.8007 2836	0.7833 6385	9
10	0.8203 4830	0.8005 1013	0.7811 9840	0.7623 9791	10
11	0.8042 6304	0.7828 9499	0.7621 4478	0.7419 9310	11
12	0.7884 9318	0.7656 6748	0.7435 5589	0.7221 3440	12
13	0.7730 3253	0.7488 1905	0.7254 2038	0.7028 0720	13
14	0.7578 7502	0.7323 4137	0.7077 2720	0.6839 9728	14
15	0.7430 1473	0.7162 2628	0.6904 6556	0.6656 9078	15
16	0.7284 4581	0.7004 6580	0.6736 2493	0.6478 7424	16
17	0.7141 6256	0.6850 5212	0.6571 9506	0.6305 3454	17
18	0.7001 5937	0.6699 7763	0.6411 6591	0.6136 5892	18
19	0.6864 3076	0.6552 3484	0.6255 2772	0.5972 3496	19
20	0.6729 7133	0.6408 1647	0.6102 7094	0.5812 5057	20
21	0.6597 7582	0.6267 1538	0.5953 8629	0.5656 9398	21
22	0.6468 3904	0.6129 2457	0.5808 6467	0.5505 5375	22
23	0.6341 5592	0.5994 3724	0.5666 9724	0.5358 1874	23
24	0.6217 2149	0.5862 4668	0.5528 7535	0.5214 7809	24
25	0.6095 3087	0.5733 4639	0.5393 9059	0.5075 2126	25
26	0.5975 7928	0.5607 2997	0.5262 3472	0.4939 3796	26
27	0.5858 6204	0.5483 9117	0.5133 9973	0.4807 1821	27
28	0.5743 7455	0.5363 2388	0.5008 7778	0.4678 5227	28
29	0.5631 1231	0.5245 2213	0.4886 6125	0.4553 3068	29
30	0.5520 7089	0.5129 8008	0.4767 4269	0.4431 4421	30
31	0.5412 4597	0.5016 9201	0.4651 1481	0.4312 8391	31
32	0.5306 3330	0.4906 5233	0.4537 7055	0.4197 4103	32
33	0.5202 2873	0.4798 5558	0.4427 0298	0.4085 0708	33
34	0.5100 2817	0.4692 9641	0.4319 0534	0.3975 7380	34
35	0.5000 2761	0.4589 6960	0.4213 7107	0.3869 3314	35
36	0.4902 2315	0.4488 7002	0.4110 9372	0.3765 7727	36
37	0.4806 1093	0.4389 9268	0.4010 6705	0.3664 9856	37
38	0.4711 8719	0.4293 3270	0.3912 8492	0.3566 8959	38
39	0.4619 4822	0.4198 8528	0.3817 4139	0.3471 4316	39
40	0.4528 9042	0.4106 4575	0.3724 3062	0.3378 5222	40
41	0.4440 1021	0.4016 0954	0.3633 4695	0.3288 0995	41
42	0.4353 0413	0.3927 7216	0.3544 8483	0.3200 0968	42
43	0.4267 6875	0.3841 2925	0.3458 3886	0.3114 4495	43
44	0.4184 0074	0.3756 7653	0.3374 0376	0.3031 0944	44
45	0.4101 9680	0.3674 0981	0.3291 7440	0.2949 9702	45
46	0.4021 5373	0.3593 2500	0.3211 4576	0.2871 0172	46
47	0.3942 6836	0.3514 1809	0.3133 1294	0.2794 1773	47
48	0.3865 3761	0.3436 8518	0.3056 7116	0.2719 3940	48
49	0.3789 5844	0.3361 2242	0.2982 1576	0.2646 6122	49
50	0.3715 2788	0.3287 2608	0.2909 4221	0.2575 7783	50

Present Value of 1 at Compound Interest

$$v^n=(1+i)^{-n}$$

n	2%	2¼%	2½%	2¾%	n
51	0.3642 4302	0.3214 9250	0.2838 4606	0.2506 8402	51
52	0.3571 0100	0.3144 1810	0.2769 2298	0.2439 7471	52
53	0.3500 9902	0.3074 9936	0.2701 6876	0.2374 4497	53
54	0.3432 3433	0.3007 3287	0.2635 7928	0.2310 9000	54
55	0.3365 0425	0.2941 1528	0.2571 5052	0.2249 0511	55
56	0.3299 0613	0.2876 4330	0.2508 7855	0.2188 8575	56
57	0.3234 3738	0.2813 1374	0.2447 5956	0.2130 2749	57
58	0.3170 9547	0.2751 2347	0.2387 8982	0.2073 2603	58
59	0.3108 7791	0.2690 6940	0.2329 6568	0.2017 7716	59
60	0.3047 8227	0.2631 4856	0.2272 8359	0.1963 7679	60
61	0.2988 0614	0.2573 5801	0.2217 4009	0.1911 2097	61
62	0.2929 4720	0.2516 9487	0.2163 3179	0.1860 0581	62
63	0.2872 0314	0.2461 5635	0.2110 5541	0.1810 2755	63
64	0.2815 7170	0.2407 3971	0.2059 0771	0.1761 8253	64
65	0.2760 5069	0.2354 4226	0.2008 8557	0.1714 6718	65
66	0.2706 3793	0.2302 6138	0.1959 8593	0.1668 7804	66
67	0.2653 3130	0.2251 9450	0.1912 0578	0.1624 1172	67
68	0.2601 2873	0.2202 3912	0.1865 4223	0.1580 6493	68
69	0.2550 2817	0.2153 9278	0.1819 9241	0.1538 3448	69
70	0.2500 2761	0.2106 5309	0.1775 5358	0.1497 1726	70
71	0.2451 2511	0.2060 1769	0.1732 2300	0.1457 1023	71
72	0.2403 1874	0.2014 8429	0.1689 9805	0.1418 1044	72
73	0.2356 0661	0.1970 5065	0.1648 7615	0.1380 1503	73
74	0.2309 8687	0.1927 1458	0.1608 5478	0.1343 2119	74
75	0.2264 5771	0.1884 7391	0.1569 3149	0.1307 2622	75
76	0.2220 1737	0.1843 2657	0.1531 0389	0.1272 2747	76
77	0.2176 6408	0.1802 7048	0.1493 6965	0.1238 2235	77
78	0.2133 9616	0.1763 0365	0.1457 2649	0.1205 0837	78
79	0.2092 1192	0.1724 2411	0.1421 7218	0.1172 8309	79
80	0.2051 0973	0.1686 2993	0.1387 0457	0.1141 4412	80
81	0.2010 8797	0.1649 1925	0.1353 2153	0.1110 8917	81
82	0.1971 4507	0.1612 9022	0.1320 2101	0.1081 1598	82
83	0.1932 7948	0.1577 4105	0.1288 0098	0.1052 2237	83
84	0.1894 8968	0.1542 6997	0.1256 5949	0.1024 0620	84
85	0.1857 7420	0.1508 7528	0.1225 9463	0.0996 6540	85
86	0.1821 3157	0.1475 5528	0.1196 0452	0.0969 9795	86
87	0.1785 6036	0.1443 0835	0.1166 8733	0.0944 0190	87
88	0.1750 5918	0.1411 3286	0.1138 4130	0.0918 7533	88
89	0.1716 2665	0.1380 2724	0.1110 6468	0.0894 1638	89
90	0.1682 6142	0.1349 8997	0.1083 5579	0.0870 2324	90
91	0.1649 6217	0.1320 1953	0.1057 1296	0.0846 9415	91
92	0.1617 2762	0.1291 1445	0.1031 3460	0.0824 2740	92
93	0.1585 5649	0.1262 7331	0.1006 1912	0.0802 2131	93
94	0.1554 4754	0.1234 9468	0.0981 6500	0.0780 7427	94
95	0.1523 9955	0.1207 7719	0.0957 7073	0.0759 8469	95
96	0.1494 1132	0.1181 1950	0.0934 3486	0.0739 5104	96
97	0.1464 8169	0.1155 2029	0.0911 5596	0.0719 7181	97
98	0.1436 0950	0.1129 7828	0.0889 3264	0.0700 4556	98
99	0.1407 9363	0.1104 9221	0.0867 6355	0.0681 7086	99
100	0.1380 3297	0.1080 6084	0.0846 4737	0.0663 4634	100

Present Value of 1 at Compound Interest

$$v^n = (1+i)^{-n}$$

n	3%	3½%	4%	4½%	n
1	0.9708 7379	0.9661 8357	0.9615 3846	0.9569 3780	1
2	0.9425 9591	0.9335 1070	0.9245 5621	0.9157 2995	2
3	0.9151 4166	0.9019 4271	0.8889 9636	0.8762 9660	3
4	0.8884 8705	0.8714 4223	0.8548 0419	0.8385 6134	4
5	0.8626 0878	0.8419 7317	0.8219 2711	0.8024 5105	5
6	0.8374 8426	0.8135 0064	0.7903 1453	0.7678 9574	6
7	0.8130 9151	0.7859 9096	0.7599 1781	0.7348 2846	7
8	0.7894 0923	0.7594 1156	0.7306 9021	0.7031 8513	8
9	0.7664 1673	0.7337 3097	0.7025 8674	0.6729 0443	9
10	0.7440 9391	0.7089 1881	0.6755 6417	0.6439 2768	10
11	0.7224 2128	0.6849 4571	0.6495 8093	0.6161 9874	11
12	0.7013 7988	0.6617 8330	0.6245 9705	0.5896 6386	12
13	0.6809 5134	0.6394 0415	0.6005 7409	0.5642 7164	13
14	0.6611 1781	0.6177 8179	0.5774 7508	0.5399 7286	14
15	0.6418 6195	0.5968 9062	0.5552 6450	0.5167 2044	15
16	0.6231 6694	0.5767 0591	0.5339 0818	0.4944 6932	16
17	0.6050 1645	0.5572 0378	0.5133 7325	0.4731 7639	17
18	0.5873 9461	0.5383 6114	0.4936 2812	0.4528 0037	18
19	0.5702 8603	0.5201 5569	0.4746 4242	0.4333 0179	19
20	0.5536 7575	0.5025 6588	0.4563 8695	0.4146 4286	20
21	0.5375 4928	0.4855 7090	0.4388 3360	0.3967 8743	21
22	0.5218 9250	0.4691 5063	0.4219 5539	0.3797 0089	22
23	0.5066 9175	0.4532 8563	0.4057 2633	0.3633 5013	23
24	0.4919 3374	0.4379 5713	0.3901 2147	0.3477 0347	24
25	0.4776 0557	0.4231 4699	0.3751 1680	0.3327 3060	25
26	0.4636 9473	0.4088 3767	0.3606 8923	0.3184 0248	26
27	0.4501 8906	0.3950 1224	0.3468 1657	0.3046 9137	27
28	0.4370 7675	0.3816 5434	0.3334 7747	0.2915 7069	28
29	0.4243 4636	0.3687 4815	0.3206 5141	0.2790 1502	29
30	0.4119 8676	0.3562 7841	0.3083 1867	0.2670 0002	30
31	0.3999 8715	0.3442 3035	0.2964 6026	0.2555 0241	31
32	0.3883 3703	0.3325 8971	0.2850 5794	0.2444 9991	32
33	0.3770 2625	0.3213 4271	0.2740 9417	0.2339 7121	33
34	0.3660 4490	0.3104 7605	0.2635 5209	0.2238 9589	34
35	0.3553 8340	0.2999 7686	0.2534 1547	0.2142 5444	35
36	0.3450 3243	0.2898 3272	0.2436 6872	0.2050 2817	36
37	0.3349 8294	0.2800 3161	0.2342 9685	0.1961 9921	37
38	0.3252 2615	0.2705 6194	0.2252 8543	0.1877 5044	38
39	0.3157 5355	0.2614 1250	0.2166 2061	0.1796 6549	39
40	0.3065 5684	0.2525 7247	0.2082 8904	0.1719 2870	40
41	0.2976 2800	0.2440 3137	0.2002 7793	0.1645 2507	41
42	0.2889 5922	0.2357 7910	0.1925 7493	0.1574 4026	42
43	0.2805 4294	0.2278 0590	0.1851 6820	0.1506 6054	43
44	0.2723 7178	0.2201 0231	0.1780 4635	0.1441 7276	44
45	0.2644 3862	0.2126 5924	0.1711 9841	0.1379 6437	45
46	0.2567 3653	0.2054 6787	0.1646 1386	0.1320 2332	46
47	0.2492 5876	0.1985 1968	0.1582 8256	0.1263 3810	47
48	0.2419 9880	0.1918 0645	0.1521 9476	0.1208 9771	48
49	0.2349 5029	0.1853 2024	0.1463 4112	0.1156 9158	49
50	0.2281 0708	0.1790 5337	0.1407 1262	0.1107 0965	50

Present Value of 1 at Compound Interest

$$v^n = (1+i)^{-n}$$

n	3%	3½%	4%	4½%	n
51	0.2214 6318	0.1729 9843	0.1353 0059	0.1059 4225	51
52	0.2150 1280	0.1671 4824	0.1300 9672	0.1013 8014	52
53	0.2087 5029	0.1614 9589	0.1250 9300	0.0970 1449	53
54	0.2026 7019	0.1560 3467	0.1202 8173	0.0928 3683	54
55	0.1967 6717	0.1507 5814	0.1156 5551	0.0888 3907	55
56	0.1910 3609	0.1456 6004	0.1112 0722	0.0850 1347	56
57	0.1854 7193	0.1407 3433	0.1069 3002	0.0813 5260	57
58	0.1800 6984	0.1359 7520	0.1028 1733	0.0778 4938	58
59	0.1748 2508	0.1313 7701	0.0988 6282	0.0744 9701	59
60	0.1697 3309	0.1269 3431	0.0950 6040	0.0712 8901	60
61	0.1647 8941	0.1226 4184	0.0914 0423	0.0682 1915	61
62	0.1599 8972	0.1184 9453	0.0878 8868	0.0652 8148	62
63	0.1553 2982	0.1144 8747	0.0845 0835	0.0624 7032	63
64	0.1508 0565	0.1106 1591	0.0812 5803	0.0597 8021	64
65	0.1464 1325	0.1068 7528	0.0781 3272	0.0572 0594	65
66	0.1421 4879	0.1032 6114	0.0751 2762	0.0547 4253	66
67	0.1380 0853	0.0997 6922	0.0722 3809	0.0523 8519	67
68	0.1339 8887	0.0963 9538	0.0694 5970	0.0501 2937	68
69	0.1300 8628	0.0931 3563	0.0667 8818	0.0479 7069	69
70	0.1262 9736	0.0899 8612	0.0642 1940	0.0459 0497	70
71	0.1226 1880	0.0869 4311	0.0617 4942	0.0439 2820	71
72	0.1190 4737	0.0840 0300	0.0593 7445	0.0420 3655	72
73	0.1155 7998	0.0811 6232	0.0570 9081	0.0402 2637	73
74	0.1122 1357	0.0784 1770	0.0548 9501	0.0384 9413	74
75	0.1089 4521	0.0757 6590	0.0527 8367	0.0368 3649	75
76	0.1057 7205	0.0732 0376	0.0507 5353	0.0352 5023	76
77	0.1026 9131	0.0707 2827	0.0488 0147	0.0337 3228	77
78	0.0997 0030	0.0683 3650	0.0469 2449	0.0322 7969	78
79	0.0967 9641	0.0660 2560	0.0451 1970	0.0308 8965	79
80	0.0939 7710	0.0637 9285	0.0433 8433	0.0295 5948	80
81	0.0912 3990	0.0616 3561	0.0417 1570	0.0282 8658	81
82	0.0885 8243	0.0595 5131	0.0401 1125	0.0270 6850	82
83	0.0860 0236	0.0575 3750	0.0385 6851	0.0259 0287	83
84	0.0834 9743	0.0555 9178	0.0370 8510	0.0247 8744	84
85	0.0810 6547	0.0537 1187	0.0356 5875	0.0237 2003	85
86	0.0787 0434	0.0518 9553	0.0342 8726	0.0226 9860	86
87	0.0764 1198	0.0501 4060	0.0329 6852	0.0217 2115	87
88	0.0741 8639	0.0484 4503	0.0317 0050	0.0207 8579	88
89	0.0720 2562	0.0468 0679	0.0304 8125	0.0198 9070	89
90	0.0699 2779	0.0452 2395	0.0293 0890	0.0190 3417	90
91	0.0678 9105	0.0436 9464	0.0281 8163	0.0182 1451	91
92	0.0659 1364	0.0422 1704	0.0270 9772	0.0174 3016	92
93	0.0639 9383	0.0407 8941	0.0260 5550	0.0166 7958	93
94	0.0621 2993	0.0394 1006	0.0250 5337	0.0159 6132	94
95	0.0603 2032	0.0380 7735	0.0240 8978	0.0152 7399	95
96	0.0585 6342	0.0367 8971	0.0231 6325	0.0146 1626	96
97	0 0568 5769	0.0355 4562	0.0222 7235	0.0139 8685	97
98	0.0552 0164	0.0343 4359	0.0214 1572	0.0133 8454	98
99	0.0535 9383	0.0331 8221	0.0205 9204	0.0128 0817	99
100	0.0520 3284	0.0320 6011	0.0198 0004	0.0122 5663	100

Present Value of 1 at Compound Interest

$$v^n = (1+i)^{-n}$$

n	5%	5½%	6%	6½%	n
1	0.9523 8095	0.9478 6730	0.9433 9623	0.9389 6714	1
2	0.9070 2948	0.8984 5242	0.8899 9644	0.8816 5928	2
3	0.8638 3760	0.8516 1366	0.8396 1928	0.8278 4909	3
4	0.8227 0247	0.8072 1674	0.7920 9366	0.7773 2309	4
5	0.7835 2617	0.7651 3435	0.7472 5817	0.7298 8084	5
6	0.7462 1540	0.7252 4583	0.7049 6054	0.6853 3412	6
7	0.7106 8133	0.6874 3681	0.6650 5711	0.6435 0621	7
8	0.6768 3936	0.6515 9887	0.6274 1237	0.6042 3119	8
9	0.6446 0892	0.6176 2926	0.5918 9846	0.5673 5323	9
10	0.6139 1325	0.5854 3058	0.5583 9478	0.5327 2604	10
11	0.5846 7929	0.5549 1050	0.5267 8753	0.5002 1224	11
12	0.5568 3742	0.5259 8152	0.4969 6936	0.4696 8285	12
13	0.5303 2135	0.4985 6068	0.4688 3902	0.4410 1676	13
14	0.5050 6795	0.4725 6937	0.4423 0096	0.4141 0025	14
15	0.4810 1710	0.4479 3305	0.4172 6506	0.3888 2652	15
16	0.4581 1152	0.4245 8109	0.3936 4628	0.3650 9533	16
17	0.4362 9669	0.4024 4653	0.3713 6442	0.3428 1251	17
18	0.4155 2065	0.3814 6590	0.3503 4379	0.3218 8969	18
19	0.3957 3396	0.3615 7906	0.3305 1301	0.3022 4384	19
20	0.3768 8948	0.3427 2896	0.3118 0473	0.2837 9703	20
21	0.3589 4236	0.3248 6158	0.2941 5540	0.2664 7608	21
22	0.3418 4987	0.3079 2567	0.2775 0510	0.2502 1228	22
23	0.3255 7131	0.2918 7267	0.2617 9726	0.2349 4111	23
24	0.3100 6791	0.2766 5656	0.2469 7855	0.2206 0198	24
25	0.2953 0277	0.2622 3370	0.2329 9863	0.2071 3801	25
26	0.2812 4073	0.2485 6275	0.2198 1003	0.1944 9579	26
27	0.2678 4832	0.2356 0450	0.2073 6795	0.1826 2515	27
28	0.2550 9364	0.2233 2181	0.1956 3014	0.1714 7902	28
29	0.2429 4632	0.2116 7944	0.1845 5674	0.1610 1316	29
30	0.2313 7745	0.2006 4402	0.1741 1013	0.1511 8607	30
31	0.2203 5947	0.1901 8390	0.1642 5484	0.1419 5875	31
32	0.2098 6617	0.1802 6910	0.1549 5740	0.1332 9460	32
33	0.1998 7254	0.1708 7119	0.1461 8622	0.1251 5925	33
34	0.1903 5480	0.1619 6321	0.1379 1153	0.1175 2042	34
35	0.1812 9029	0.1535 1963	0.1301 0522	0.1103 4781	35
36	0.1726 5741	0.1455 1624	0.1227 4077	0.1036 1297	36
37	0.1644 3563	0.1379 3008	0.1157 9318	0.0972 8917	37
38	0.1566 0536	0.1307 3941	0.1092 3885	0.0913 5134	38
39	0.1491 4797	0.1239 2362	0.1030 5552	0.0857 7590	39
40	0.1420 4568	0.1174 6314	0.0972 2219	0.0805 4075	40
41	0.1352 8160	0.1113 3947	0.0917 1905	0.0756 2512	41
42	0.1288 3962	0.1055 3504	0.0865 2740	0.0710 0950	42
43	0.1227 0440	0.1000 3322	0.0816 2962	0.0666 7559	43
44	0.1168 6133	0.0948 1822	0.0770 0908	0.0626 0619	44
45	0.1112 9651	0.0898 7509	0.0726 5007	0.0587 8515	45
46	0.1059 9668	0.0851 8965	0.0685 3781	0.0551 9733	46
47	0.1009 4921	0.0807 4849	0.0646 5831	0.0518 2848	47
48	0.0961 4211	0.0765 3885	0.0609 9840	0.0486 6524	48
49	0.0915 6391	0.0725 4867	0.0575 4566	0.0456 9506	49
50	0.0872 0373	0.0687 6652	0.0542 8836	0.0429 0616	50

Present Value of 1 at Compound Interest

$$v^n = (1+i)^{-n}$$

n	5%	5½%	6%	6½%	n
51	0.0830 5117	0.0651 8153	0.0512 1544	0.0402 8747	51
52	0.0790 9635	0.0617 8344	0.0483 1645	0.0378 2861	52
53	0.0753 2986	0.0585 6250	0.0455 8156	0.0355 1982	53
54	0.0717 4272	0.0555 0948	0.0430 0147	0.0333 5195	54
55	0.0683 2640	0.0526 1562	0.0405 6742	0.0313 1638	55
56	0.0650 7276	0.0498 7263	0.0382 7115	0.0294 0505	56
57	0.0619 7406	0.0472 7263	0.0361 0486	0.0276 1038	57
58	0.0590 2291	0.0448 0818	0.0340 6119	0.0259 2524	58
59	0.0562 1230	0.0424 7221	0.0321 3320	0.0243 4295	59
60	0.0535 3552	0.0402 5802	0.0303 1434	0.0228 5723	60
61	0.0509 8621	0.0381 5926	0.0285 9843	0.0214 6218	61
62	0.0485 5830	0.0361 6992	0.0269 7965	0.0201 5229	62
63	0.0462 4600	0.0342 8428	0.0254 5250	0.0189 2233	63
64	0.0440 4381	0.0324 9695	0.0240 1179	0.0177 6745	64
65	0.0419 4648	0.0308 0279	0.0226 5264	0.0166 8305	65
66	0.0399 4903	0.0291 9696	0.0213 7041	0.0156 6484	66
67	0.0380 4670	0.0276 7485	0.0201 6077	0.0147 0877	67
68	0.0362 3495	0.0262 3208	0.0190 1959	0.0138 1105	68
69	0.0345 0948	0.0248 6453	0.0179 4301	0.0129 6812	69
70	0.0328 6617	0.0235 6828	0.0169 2737	0.0121 7664	70
71	0.0313 0111	0.0223 3960	0.0159 6921	0.0114 3346	71
72	0.0298 1058	0.0211 7498	0.0150 6530	0.0107 3565	72
73	0.0283 9103	0.0200 7107	0.0142 1254	0.0100 8042	73
74	0.0270 3908	0.0190 2471	0.0134 0806	0.0094 6518	74
75	0.0257 5150	0.0180 3290	0.0126 4911	0.0088 8750	75
76	0.0245 2524	0.0170 9279	0.0119 3313	0.0083 4507	76
77	0.0233 5737	0.0162 0170	0.0112 5767	0.0078 3574	77
78	0.0222 4512	0.0153 5706	0.0106 2044	0.0073 5751	78
79	0.0211 8582	0.0145 5646	0.0100 1928	0.0069 0846	79
80	0.0201 7698	0.0137 9759	0.0094 5215	0.0064 8681	80
81	0.0192 1617	0.0130 7828	0.0089 1713	0.0060 9090	81
82	0.0183 0111	0.0123 9648	0.0084 1238	0.0057 1916	82
83	0.0174 2963	0.0117 5022	0.0079 3621	0.0053 7010	83
84	0.0165 9965	0.0111 3765	0.0074 8699	0.0050 4235	84
85	0.0158 0919	0.0105 5701	0.0070 6320	0.0047 3460	85
86	0.0150 5637	0.0100 0664	0.0066 6340	0.0044 4563	86
87	0.0143 3940	0.0094 8497	0.0062 8622	0.0041 7430	87
88	0.0136 5657	0.0089 9049	0.0059 3040	0.0039 1953	88
89	0.0130 0626	0.0085 2180	0.0055 9472	0.0036 8031	89
90	0.0123 8691	0.0080 7753	0.0052 7803	0.0034 5569	90
91	0.0117 9706	0.0076 5643	0.0049 7928	0.0032 4478	91
92	0.0112 3530	0.0072 5728	0.0046 9743	0.0030 4674	92
93	0.0107 0028	0.0068 7894	0.0044 3154	0.0028 6079	93
94	0.0101 9074	0.0065 2032	0.0041 8070	0.0026 8619	94
95	0.0097 0547	0.0061 8040	0.0039 4405	0.0025 2224	95
96	0.0092 4331	0.0058 5820	0.0037 2081	0.0023 6831	96
97	0.0088 0315	0.0055 5279	0.0035 1019	0.0022 2376	97
98	0.0083 8395	0.0052 6331	0.0033 1150	0.0020 8804	98
99	0.0079 8471	0.0049 8892	0.0031 2406	0.0019 6060	99
100	0.0076 0449	0.0047 2883	0.0029 4723	0.0018 4094	100

Present Value of 1 at Compound Interest

$$v^n = (1+i)^{-n}$$

n	7%	7½%	8%	8½%	n
1	0.9345 7944	0.9302 3256	0.9259 2593	0.9216 5899	1
2	0.8734 3873	0.8653 3261	0.8573 3882	0.8494 5529	2
3	0.8162 9788	0.8049 6057	0.7938 3224	0.7829 0810	3
4	0.7628 9521	0.7488 0053	0.7350 2985	0.7215 7428	4
5	0.7129 8618	0.6965 5863	0.6805 8320	0.6650 4542	5
6	0.6663 4222	0.6479 6152	0.6301 6963	0.6129 4509	6
7	0.6227 4974	0.6027 5490	0.5834 9040	0.5649 2635	7
8	0.5820 0910	0.5607 0223	0.5402 6888	0.5206 6945	8
9	0.5439 3374	0.5215 8347	0.5002 4897	0.4798 7968	9
10	0.5083 4929	0.4851 9393	0.4631 9349	0.4422 8542	10
11	0.4750 9280	0.4513 4319	0.4288 8286	0.4076 3633	11
12	0.4440 1196	0.4198 5413	0.3971 1376	0.3757 0168	12
13	0.4149 6445	0.3905 6198	0.3676 9792	0.3462 6883	13
14	0.3878 1724	0.3633 1347	0.3404 6104	0.3191 4178	14
15	0.3624 4602	0.3379 6602	0.3152 4170	0.2941 3989	15
16	0.3387 3460	0.3143 8699	0.2918 9047	0.2710 9667	16
17	0.3165 7439	0.2924 5302	0.2702 6895	0.2498 5869	17
18	0.2958 6392	0.2720 4932	0.2502 4903	0.2302 8450	18
19	0.2765 0832	0.2530 6913	0.2317 1206	0.2122 4378	19
20	0.2584 1900	0.2354 1315	0.2145 4821	0.1956 1639	20
21	0.2415 1309	0.2189 8897	0.1986 5575	0.1802 9160	21
22	0.2257 1317	0.2037 1067	0.1839 4051	0.1661 6738	22
23	0.2109 4688	0.1894 9830	0.1703 1528	0.1531 4965	23
24	0.1971 4662	0.1762 7749	0.1576 9934	0.1411 5176	24
25	0.1842 4918	0.1639 7906	0.1460 1790	0.1300 9378	25
26	0.1721 9549	0.1525 3866	0.1352 0176	0.1199 0210	26
27	0.1609 3037	0.1418 9643	0.1251 8682	0.1105 0885	27
28	0.1504 0221	0.1319 9668	0.1159 1372	0.1018 5148	28
29	0.1405 6282	0.1227 8761	0.1073 2752	0.0938 7233	29
30	0.1313 6712	0.1142 2103	0.0993 7733	0.0865 1828	30
31	0.1227 7301	0.1062 5212	0.0920 1605	0.0797 4035	31
32	0.1147 4113	0.0988 3918	0.0852 0005	0.0734 9341	32
33	0.1072 3470	0.0919 4343	0.0788 8893	0.0677 3586	33
34	0.1002 1934	0.0855 2877	0.0730 4531	0.0624 2936	34
35	0.0936 6294	0.0795 6164	0.0676 3454	0.0575 3858	35
36	0.0875 3546	0.0740 1083	0.0626 2458	0.0530 3095	36
37	0.0818 0884	0.0688 4729	0.0579 8572	0.0488 7645	37
38	0.0764 5686	0.0640 4399	0.0536 9048	0.0450 4742	38
39	0.0714 5501	0.0595 7580	0.0497 1341	0.0415 1836	39
40	0.0667 8038	0.0554 1935	0.0460 3093	0.0382 6577	40
41	0.0624 1157	0.0515 5288	0.0426 2123	0.0352 6799	41
42	0.0583 2857	0.0479 5617	0.0394 6411	0.0325 0506	42
43	0.0545 1268	0.0446 1039	0.0365 4084	0.0299 5858	43
44	0.0509 4643	0.0414 9804	0.0338 3411	0.0276 1160	44
45	0.0476 1349	0.0386 0283	0.0313 2788	0.0254 4848	45
46	0.0444 9859	0.0359 0961	0.0290 0730	0.0234 5482	46
47	0.0415 8747	0.0334 0428	0.0268 5861	0.0216 1734	47
48	0.0388 6679	0.0310 7375	0.0248 6908	0.0199 2382	48
49	0.0363 2410	0.0289 0582	0.0230 2693	0.0183 6297	49
50	0.0339 4776	0.0268 8913	0.0213 2123	0.0169 2439	50

Present Value of 1 at Compound Interest

$$v^n = (1+i)^{-n}$$

n	7%	7½%	8%	8½%	n
51	0.0317 2688	0.0250 1315	0.0197 4188	0.0155 9852	51
52	0.0296 5129	0.0232 6804	0.0182 7952	0.0143 7651	52
53	0.0277 1148	0.0216 4469	0.0169 2548	0.0132 5024	53
54	0.0258 9858	0.0201 3460	0.0156 7174	0.0122 1221	54
55	0.0242 0428	0.0187 2986	0.0145 1087	0.0112 5549	55
56	0.0226 2083	0.0174 2312	0.0134 3599	0.0103 7372	56
57	0.0211 4096	0.0162 0756	0.0124 4073	0.0095 6104	57
58	0.0197 5791	0.0150 7680	0.0115 1920	0.0088 1201	58
59	0.0184 6533	0.0140 2493	0.0106 6592	0.0081 2167	59
60	0.0172 5732	0.0130 4644	0.0098 7585	0.0074 8541	60
61	0.0161 2834	0.0121 3623	0.0091 4431	0.0068 9900	61
62	0.0150 7321	0.0112 8951	0.0084 6695	0.0063 5852	62
63	0.0140 8711	0.0105 0187	0.0078 3977	0.0058 6039	63
64	0.0131 6553	0.0097 6918	0.0072 5905	0.0054 0128	64
65	0.0123 0423	0.0090 8761	0.0067 2134	0.0049 7814	65
66	0.0114 9928	0.0084 5359	0.0062 2346	0.0045 8815	66
67	0.0107 4699	0.0078 6381	0.0057 6247	0.0042 2871	67
68	0.0100 4392	0.0073 1517	0.0053 3562	0.0038 9743	68
69	0.0093 8684	0.0068 0481	0.0049 4039	0.0035 9210	69
70	0.0087 7275	0.0063 3006	0.0045 7443	0.0033 1069	70
71	0.0081 9883	0.0058 8842	0.0042 3558	0.0030 5133	71
72	0.0076 6246	0.0054 7760	0.0039 2184	0.0028 1228	72
73	0.0071 6117	0.0050 9544	0.0036 3133	0.0025 9196	73
74	0.0066 9269	0.0047 3995	0.0033 6234	0.0023 8891	74
75	0.0062 5485	0.0044 0925	0.0031 1328	0.0022 0176	75
76	0.0058 4565	0.0041 0163	0.0028 8267	0.0020 2927	76
77	0.0054 6323	0.0038 1547	0.0026 6914	0.0018 7030	77
78	0.0051 0582	0.0035 4928	0.0024 7142	0.0017 2377	78
79	0.0047 7179	0.0033 0165	0.0022 8835	0.0015 8873	79
80	0.0044 5962	0.0030 7130	0.0021 1885	0.0014 6427	80
81	0.0041 6787	0.0028 5703	0.0019 6190	0.0013 4956	81
82	0.0038 9520	0.0026 5770	0.0018 1657	0.0012 4383	82
83	0.0036 4038	0.0024 7228	0.0016 8201	0.0011 4639	83
84	0.0034 0222	0.0022 9979	0.0015 5742	0.0010 5658	84
85	0.0031 7965	0.0021 3934	0.0014 4205	0.0009 7381	85
86	0.0029 7163	0.0019 9009	0.0013 3523	0.0008 9752	86
87	0.0027 7723	0.0018 5124	0.0012 3633	0.0008 2720	87
88	0.0025 9554	0.0017 2209	0.0011 4475	0.0007 6240	88
89	0.0024 2574	0.0016 0194	0.0010 5995	0.0007 0267	89
90	0.0022 6704	0.0014 9018	0.0009 8144	0.0006 4762	90
91	0.0021 1873	0.0013 8621	0.0009 0874	0.0005 9689	91
92	0.0019 8012	0.0012 8950	0.0008 4142	0.0005 5013	92
93	0.0018 5058	0.0011 9953	0.0007 7910	0.0005 0703	93
94	0.0017 2952	0.0011 1585	0.0007 2138	0.0004 6731	94
95	0.0016 1637	0.0010 3800	0.0006 6795	0.0004 3070	95
96	0.0015 1063	0.0009 6558	0.0006 1847	0.0003 9696	96
97	0.0014 1180	0.0008 9821	0.0005 7266	0.0003 6586	97
98	0.0013 1944	0.0008 3555	0.0005 3024	0.0003 3720	98
99	0.0012 3312	0.0007 7725	0.0004 9096	0.0003 1078	99
100	0.0011 5245	0.0007 2303	0.0004 5459	0.0002 8644	100

Amount of 1 per Annum at Compound Interest

$$s_{\overline{n}|}=[(1+i)^n-1]/i$$

n	$\frac{1}{4}\%$	$\frac{7}{24}\%$	$\frac{1}{3}\%$	$\frac{5}{12}\%$	n
1	1.0000 0000	1.0000 0000	1.0000 0000	1.0000 0000	1
2	2.0025 0000	2.0029 1667	2.0033 3333	2.0041 6667	2
3	3.0075 0625	3.0087 5851	3.0100 1111	3.0125 1736	3
4	4.0150 2502	4.0175 3405	4.0200 4448	4.0250 6952	4
5	5.0250 6258	5.0292 5186	5.0334 4463	5.0418 4064	5
6	6.0376 2523	6.0439 2051	6.0502 2278	6.0628 4831	6
7	7.0527 1930	7.0615 4861	7.0703 9019	7.0881 1018	7
8	8.0703 5110	8.0821 4480	8.0939 5816	8.1176 4397	8
9	9.0905 2697	9.1057 1772	9.1209 3802	9.1514 6749	9
10	10,1132 5329	10.1322 7606	10.1513 4114	10.1895 9860	10
11	11.1385 3642	11.1618 2853	11.1851 7895	11.2320 5526	11
12	12.1663 8277	12.1943 8387	12.2224 6288	12.2788 5549	12
13	13.1967 9872	13.2299 5082	13.2632 0442	13.3300 1739	13
14	14.2297 9072	14.2685 3818	14.3074 1510	14.3855 5913	14
15	15.2653 6520	15.3101 5475	15.3551 0648	15.4454 9896	15
16	16.3035 2861	16.3548 0936	16.4062 9017	16.5098 5520	16
17	17.3442 8743	17.4025 1089	17.4609 7781	17.5786 4627	17
18	18.3876 4815	18.4532 6822	18.5191 8107	18.6518 9063	18
19	19.4336 1727	19.5070 9025	19.5809 1167	19.7296 0684	19
20	20.4822 0131	20.5639 8593	20.6461 8137	20.8118 1353	20
21	21.5334 0682	21.6239 6422	21.7150 0198	21.8985 2942	21
22	22.5872 4033	22.6870 3412	22.7873 8532	22.9897 7330	22
23	23.6437 0843	23.7532 0463	23.8633 4327	24.0855 6402	23
24	24.7028 1770	24.8224 8481	24.9428 8775	25.1859 2054	24
25	25.7645 7475	25.8948 8373	26.0260 3071	26.2908 6187	25
26	26.8289 8619	26.9704 1047	27.1127 8414	27.4004 0713	26
27	27.8960 5865	28.0490 7417	28.2031 6009	28.5145 7549	27
28	28.9657 9880	29.1308 8397	29.2971 7062	29.6333 8622	28
29	30.0382 1330	30.2158 4904	30.3948 2786	30.7568 5867	29
30	31.1133 0883	31.3039 7860	31.4961 4395	31.8850 1224	30
31	32.1910 9210	32.3952 8188	32.6011 3110	33.0178 6646	31
32	33.2715 6983	33.4897 6811	33.7098 0154	34.1554 4090	32
33	34.3547 4876	34.5874 4660	34.8221 6754	35.2977 5524	33
34	35.4406 3563	35.6883 2666	35.9382 4143	36.4448 2922	34
35	36.5292 3722	36.7924 1761	37.0580 3557	37.5966 8268	35
36	37.6205 6031	37.8997 2883	38.1815 6236	38.7533 3552	36
37	38.7146 1171	39.0102 6970	39.3088 3423	39.9148 0775	37
38	39.8113 9824	40.1240 4966	40.4398 6368	41.0811 1945	38
39	40.9109 2673	41.2410 7813	41.5746 6322	42.2522 9078	39
40	42.0132 0405	42.3613 6461	42.7132 4543	43.4283 4199	40
41	43.1182 3706	43.4849 1859	43.8556 2292	44.6092 9342	41
42	44.2260 3265	44.6117 4961	45.0018 0833	45.7951 6548	42
43	45.3365 9774	45.7418 6721	46.1518 1436	46.9859 7866	43
44	46.4499 3923	46,8752 8099	47.3056 5374	48.1817 5358	44
45	47.5660 6408	48.0120 0056	48.4633 3925	49.3825 1088	45
46	48.6849 7924	49.1520 3556	49.6248 8371	50.5882 7134	46
47	49.8066 9169	50.2953 9566	50.7902 9999	51.7990 5581	47
48	50.9312 0842	51.4420 9057	51.9596 0099	53.0148 8521	48
49	52.0585 3644	52.5921 3000	53.1327 9966	54.2357 8056	49
50	53.1886 8278	53.7455 2371	54.3099 0899	55.4617 6298	50

Amount of 1 per Annum at Compound Interest

$$s_{\overline{n|}} = [(1+i)^n - 1]/i$$

n	¼%	7/24%	⅓%	5/12%	n
51	54.3216 5449	54.9022 8149	55.4909 4202	56.6928 5366	51
52	55.4574 5862	56.0624 1314	56.6759 1183	57.9290 7388	52
53	56.5961 0227	57.2259 2851	57.8648 3154	59.1704 4503	53
54	57.7375 9252	58.3928 3747	59.0577 1431	60.4169 8855	54
55	58.8819 3650	59.5631 4991	60.2545 7336	61.6687 2600	55
56	60.0291 4135	60.7368 7577	61.4554 2194	62.9256 7902	56
57	61.1792 1420	61.9140 2499	62.6602 7334	64.1878 6935	57
58	62.3321 6223	63.0946 0756	63.8691 4092	65.4553 1881	58
59	63.4879 9264	64.2786 3350	65.0820 3806	66.7280 4930	59
60	64.6467 1262	65.4661 1285	66.2989 7818	68.0060 8284	60
61	65.8083 2940	66.6570 5568	67.5199 7478	69.2894 4152	61
62	66.9728 5023	67.8514 7209	68.7450 4136	70.5781 4753	62
63	68.1402 8235	69.0493 7222	69.9741 9150	71.8722 2314	63
64	69.3106 3306	70.2507 6622	71.2074 3880	73.1716 9074	64
65	70.4839 0964	71.4556 6429	72.4447 9693	74.4765 7278	65
66	71.6601 1942	72.6640 7664	73.6862 7959	75.7868 9184	66
67	72.8392 6971	73.8760 1353	74.9319 0052	77.1026 7055	67
68	74.0213 6789	75.0914 8524	76.1816 7352	78.4239 3168	68
69	75.2064 2131	76.3105 0207	77.4356 1243	79.7506 9806	69
70	76.3944 3736	77.5330 7437	78.6937 3114	81.0829 9264	70
71	77.5854 2345	78.7592 1250	79.9560 4358	82.4208 3844	71
72	78.7793 8701	79.9889 2687	81.2225 6372	83.7642 5860	72
73	79.9763 3548	81.2222 2791	82.4933 0560	85.1132 7634	73
74	81.1762 7632	82.4591 2607	83.7682 8329	86.4679 1500	74
75	82.3792 1701	83.6996 3186	85.0475 1090	87.8281 9797	75
76	83.5851 6505	84.9437 5578	86.3310 0260	89.1941 4880	76
77	84.7941 2797	86.1915 0840	87.6187 7261	90.5657 9109	77
78	86.0061 1329	87.4429 0030	88.9108 3519	91.9431 4855	78
79	87.2211 2857	88.6979 4209	90.2072 0464	93.3262 4500	79
80	88.4391 8139	89.9566 4443	91.5078 9532	94.7151 0436	80
81	89.6602 7934	91.2190 1797	92.8129 2164	96.1097 5062	81
82	90.8844 3004	92.4850 7344	94.1222 9804	97.5102 0792	82
83	92.1116 4112	93.7548 2157	95.4360 3904	98.9165 0045	83
84	93.3419 2022	95.0282 7313	96.7541 5917	100.3286 5254	84
85	94.5752 7502	96.3054 3893	98.0766 7303	101.7466 8859	85
86	95.8117 1321	97.5863 2980	99.4035 9527	103.1706 3312	86
87	97.0512 4249	98.8709 5659	100.7349 4059	104.6005 1076	87
88	98.2938 7060	100.1593 3021	102.0707 2373	106.0363 4622	88
89	99.5396 0527	101.4514 6159	103.4109 5947	107.4781 6433	89
90	100.7884 5429	102.7473 6169	104.7556 6267	108.9259 9002	90
91	102.0404 2542	104.0470 4149	106.1048 4821	110.3798 4831	91
92	103.2955 2649	105.3505 1203	107.4585 3104	111.8397 6434	92
93	104.5537 6530	106.6577 8436	108.8167 2614	113.3057 6336	93
94	105.8151 4972	107.9688 6956	110.1794 4856	114.7778 7071	94
95	107.0796 8759	109.2837 7877	111.5467 1339	116.2561 1184	95
96	108.3473 8681	110.6025 2312	112.9185 3577	117.7405 1230	96
97	109.6182 5528	111.9251 1381	114.2949 3089	119.2310 9777	97
98	110.8923 0091	113.2515 6206	115.6759 1399	120.7278 9401	98
99	112.1695 3167	114.5818 7912	117.0615 0037	122.2309 2690	99
100	113.4499 5550	115.9160 7626	118.4517 0537	123.7402 2243	100

Amount of 1 per Annum at Compound Interest

$$s_{\overline{n}|}=[(1+i)^n-1]/i$$

n	$\frac{1}{4}\%$	$\frac{7}{24}\%$	$\frac{1}{3}\%$	$\frac{5}{12}\%$	n
101	114.7335 8038	117.2541 6482	119.8465 4439	125.2558 0669	101
102	116.0204 1434	118.5961 5613	121.2460 3287	126.7777 0589	102
103	117.3104 6537	119.9420 6159	122.6501 8632	128.3059 4633	103
104	118.6037 4153	121.2918 9260	124.0590 2027	129.8405 5444	104
105	119.9002 5089	122.6456 6062	125.4725 5034	131.3815 5675	105
106	121.2000 0152	124.0033 7713	126.8907 9217	132.9289 7990	106
107	122.5030 0152	125.3650 5365	128.3137 6148	134.4828 5065	107
108	123.8092 5902	126.7307 0172	129.7414 7402	136.0431 9586	108
109	125.1187 8217	128.1003 3294	131.1739 4560	137.6100 4251	109
110	126.4315 7913	129.4739 5891	132.6111 9208	139.1834 1769	110
111	127.7476 5807	130.8515 9129	134.0532 2939	140.7633 4860	111
112	129.0670 2722	132.2332 4176	135.5000 7349	142.3498 6255	112
113	130.3896 9479	133.6189 2205	136.9517 4040	143.9429 8698	113
114	131.7156 6902	135.0086 4391	138.4082 4620	145.5427 4942	114
115	133.0449 5820	136.4024 1912	139.8696 0702	147.1491 7754	115
116	134.3775 7059	137.8002 5951	141.3358 3905	148.7622 9912	116
117	135.7135 1452	139.2021 7693	142.8069 5851	150.3821 4203	117
118	137.0527 9830	140.6081 8328	144.2829 8170	152.0087 3429	118
119	138.3954 3030	142.0182 9048	145.7639 2498	153.6421 0401	119
120	139.7414 1888	143.4325 1049	147.2498 0477	155.2822 7945	120
121	141.0907 7242	144.8508 5532	148.7406 3745	156.9292 8895	121
122	142.4434 9935	146.2733 3698	150.2364 3958	158.5831 6098	122
123	143.7996 0810	147.6999 6754	151.7372 2771	160.2439 2415	123
124	145.1591 0712	149.1307 5912	153.2430 1847	161.9116 0717	124
125	146.5220 0489	150.5657 2383	154.7538 2853	163.5862 3887	125
126	147.8883 0990	152.0048 7386	156.2696 7463	165.2678 4819	126
127	149.2580 3068	153.4482 2141	157.7905 7354	166.9564 6423	127
128	150.6311 7575	154.8957 7872	159.3165 4212	168.6521 1616	128
129	152.0077 5369	156.3475 5807	160.8475 9726	170.3548 3331	129
130	153.3877 7308	157.8035 7178	162.3837 5592	172.0646 4512	130
131	154.7712 4251	159.2638 3220	163.9250 3510	173.7815 8114	131
132	156.1581 7062	160.7283 5171	165.4714 5189	175.5056 7106	132
133	157.5485 6604	162.1971 4274	167.0230 2339	177.2369 4469	133
134	158.9424 3746	163.6702 1774	168.5797 6680	178.9754 3196	134
135	160.3397 9355	165.1475 8920	170.1416 9936	180.7211 6293	135
136	161.7406 4304	166.6292 6967	171.7088 3836	182.4741 6777	136
137	163.1449 9464	168.1152 7171	173.2812 0115	184.2344 7681	137
138	164.5528 5713	169.6056 0792	174.8588 0516	186.0021 2046	138
139	165.9642 3927	171.1002 9094	176.4416 6784	187.7771 2929	139
140	167.3791 4987	172.5993 3346	178.0298 0673	189.5595 3400	140
141	168.7975 9775	174.1027 4818	179.6232 3942	191.3493 6539	141
142	170.2195 9174	175.6105 4786	181.2219 8355	193.1466 5441	142
143	171.6451 4072	177.1227 4529	182.8260 5683	194.9514 3214	143
144	173.0742 5357	178.6393 5330	184.4354 7702	196.7637 2977	144
145	174.5069 3921	180.1603 8475	186.0502 6194	198.5835 7865	145
146	175.9432 0655	181.6858 5254	187.6704 2948	200.4110 1023	146
147	177.3830 6457	183.2157 6961	189.2959 9758	202.2460 5610	147
148	178.8265 2223	184.7501 4893	190.9269 8424	204.0887 4800	148
149	180.2735 8854	186.2890 0353	192.5634 0752	205.9391 1779	149
150	181.7242 7251	187.8323 4646	194.2052 8554	207.7971 9744	150

Amount of 1 per Annum at Compound Interest

$$s_{\overline{n|}}=[(1+i)^n-1]/i$$

n	$\frac{1}{4}\%$	$\frac{7}{24}\%$	$\frac{1}{3}\%$	$\frac{5}{12}\%$	n
151	183.1785 8319	189.3801 9080	195.8526 3650	209.6630 1910	151
152	184.6365 2965	190.9325 4969	197.5054 7862	211.5366 1501	152
153	186.0981 2097	192.4894 3630	199.1638 3021	213.4180 1758	153
154	187.5633 6627	194.0508 6382	200.8277 0965	215.3072 5932	154
155	189.0322 7469	195.6168 4551	202.4971 3534	217.2043 7290	155
156	190.5048 5538	197.1873 9464	204.1721 2580	219.1093 9112	156
157	191.9811 1752	198.7625 2454	205.8526 9955	221.0223 4691	157
158	193.4610 7031	200.3422 4857	207.5388 7521	222.9432 7336	158
159	194.9447 2298	201.9265 8013	209.2306 7146	224.8722 0366	159
160	196.4320 8479	203.5155 3265	210.9281 0704	226.8091 7118	160
161	197.9231 6500	205.1091 1962	212.6312 0073	228.7542 0939	161
162	199.4179 7292	206.7073 5455	214.3399 7139	230.7073 5193	162
163	200.9165 1785	208.3102 5101	216.0544 3797	232.6686 3256	163
164	202.4188 0914	209.9178 2257	217.7746 1942	234.6380 8520	164
165	203.9248 5617	211.5300 8289	219.5005 3482	236.6157 4389	165
166	205.4346 6831	213.1470 4563	221.2322 0327	238.6016 4282	166
167	206.9482 5498	214.7687 2451	222.9696 4395	240.5958 1633	167
168	208.4656 2562	216.3951 3329	224.7128 7610	242.5982 9890	168
169	209.9867 8968	218.0262 8576	226.4619 1902	244.6091 2515	169
170	211.5117 5665	219.6621 9576	228.2167 9208	246.6283 2983	170
171	213.0405 3605	221.3028 7717	229.9775 1472	248.6559 4788	171
172	214.5731 3739	222.9483 4389	231.7441 0643	250.6920 1433	172
173	216.1095 7023	224.5986 0989	233.5165 8679	252.7365 6439	173
174	217.6498 4415	226.2536 8917	235.2949 7541	254.7896 3340	174
175	219.1939 6876	227.9135 9577	237.0792 9200	256.8512 5688	175
176	220.7419 5369	229.5783 4375	238.8695 5630	258.9214 7045	176
177	222.2938 0857	231.2479 4726	240.6657 8816	261.0003 0991	177
178	223.8495 4309	232.9224 2044	242.4680 0745	263.0878 1120	178
179	225.4091 6695	234.6017 7750	244.2762 3414	265.1840 1041	179
180	226.9726 8987	236.2860 3268	246.0904 8826	267.2889 4379	180
181	228.5401 2159	237.9752 0028	247.9107 8988	269.4026 4772	181
182	230.1114 7190	239.6692 9461	249.7371 5918	271.5251 5875	182
183	231.6867 5058	241.3683 3005	251.5696 1638	273.6565 1358	183
184	233.2659 6745	243.0723 2101	253.4081 8177	275.7967 4905	184
185	234.8491 3237	244.7812 8195	255.2528 7571	277.9459 0218	185
186	236.4362 5520	246.4952 2736	257.1037 1863	280.1040 1010	186
187	238.0273 4584	248.2141 7177	258.9607 3102	282.2711 1014	187
188	239.6224 1420	249.9381 2977	260.8239 3346	284.4472 3977	188
189	241.2214 7024	251.6671 1598	262.6933 4657	286.6324 3660	189
190	242.8245 2392	253.4011 4507	264.5689 9106	288.8267 3842	190
191	244.4315 8523	255.1402 3174	266.4508 8769	291.0301 8316	191
192	246.0426 6419	256.8843 9075	268.3390 5732	293.2428 0892	192
193	247.6577 7085	258.6336 3689	270.2335 2084	295.4646 5396	193
194	249.2769 1528	260.3879 8500	272.1342 9925	297.6957 5669	194
195	250.9001 0756	262.1474 4995	274.0414 1358	299.9361 5568	195
196	252.5273 5783	263.9120 4668	275.9548 8495	302.1858 8966	196
197	254.1586 7623	265.6817 9015	277.8747 3457	304.4449 9753	197
198	255.7940 7292	267.4566 9537	279.8009 8369	306.7135 1835	198
199	257.4335 5810	269.2367 7740	281.7336 5363	308.9914 9135	199
200	259.0771 4200	271.0220 5134	283.6727 6581	311.2789 5589	200

Amount of 1 per Annum at Compound Interest

$$s_{\overline{n}|} = [(1+i)^n - 1]/i$$

n	$\frac{1}{2}\%$	$\frac{7}{12}\%$	$\frac{5}{8}\%$	$\frac{2}{3}\%$	n
1	1.0000 0000	1.0000 0000	1.0000 0000	1.0000 0000	1
2	2.0050 0000	2.0058 3333	2.0062 5000	2.0066 6667	2
3	3.0150 2500	3.0175 3403	3.1087 8906	3.0200 4444	3
4	4.0301 0013	4.0351 3631	4.0376 5649	4.0401 7807	4
5	5.0502 5063	5.0586 7460	5.0628 9185	5.0671 1259	5
6	6.0755 0188	6.0881 8354	6.0945 3492	6.1008 9335	6
7	7.1058 7939	7.1236 9794	7.1326 2576	7.1415 6597	7
8	8.1414 0879	8.1652 5284	8.1772 0468	8.1891 7641	8
9	9.1821 1583	9.2128 8349	9.2283 1220	9.2437 7092	9
10	10.2280 2641	10.2666 2531	10.2859 8916	10.3053 9606	10
11	11.2791 6654	11.3265 1396	11.3502 7659	11.3740 9870	11
12	12.3355 6237	12.3925 8529	12.4212 1582	12.4499 2602	12
13	13.3972 4018	13.4648 7537	13.4988 4842	13.5329 2553	13
14	14.4642 2639	14.5434 2048	14.5832 1622	14.6231 4503	14
15	15.5365 4752	15.6282 5710	15.6743 6132	15.7206 3266	15
16	16.6142 3026	16.7194 2193	16.7723 2608	16.8254 3688	16
17	17.6973 0141	17.8169 5189	17.8771 5312	17.9376 0646	17
18	18.7857 8791	18.9208 8411	18.9888 8532	19.0571 9051	18
19	19.8797 1685	20.0312 5593	20.1075 6586	20.1842 3844	19
20	20.9791 1544	21.1481 0493	21.2332 3814	21.3188 0003	20
21	22.0840 1101	22.2714 6887	22.3659 4588	22.4609 2536	21
22	23.1944 3107	23.4013 8577	23.5057 3304	23.6106 6487	22
23	24.3104 0322	24.5378 9386	24.6526 4387	24.7680 6930	23
24	25.4319 5524	25.6810 3157	25.8067 2290	25.9331 8976	24
25	26.5591 1502	26.8308 3759	26.9680 1492	27.1060 7769	25
26	27.6919 1059	27.9873 5081	28.1365 6501	28.2867 8488	26
27	28.8303 7015	29.1506 1035	29.3124 1854	29.4753 6344	27
28	29.9745 2200	30.3206 5558	30.4956 2116	30.6718 6586	28
29	31.1243 9461	31.4975 2607	31.6862 1879	31.8763 4497	29
30	32.2800 1658	32.6812 6164	32.8842 5766	33.0888 5394	30
31	33.4414 1666	33.8719 0233	34.0897 8427	34.3094 4630	31
32	34.6086 2375	35.0694 8843	35.3028 4542	35.5381 7594	32
33	35.7816 6686	36.2740 6045	36.5234 8820	36.7750 9711	33
34	36.9605 7520	37.4856 5913	37.7517 6000	38.0202 6443	34
35	38.1453 7807	38.7043 2548	38.9877 0850	39.2737 3286	35
36	39.3361 0496	39.9301 0071	40.2313 8168	40.5355 5774	36
37	40.5327 8549	41.1630 2630	41.4828 2782	41.8057 9479	37
38	41.7354 4942	42.4031 4395	42.7420 9549	43.0845 0009	38
39	42.9441 2666	43.6504 9562	44.0092 3359	44.3717 3009	39
40	44.1588 4730	44.9051 2352	45.2842 9130	45.6675 4163	40
41	45.3796 4153	46.1670 7007	46.5673 1812	46.9719 9191	41
42	46.6065 3974	47.4363 7798	47.8583 6386	48.2851 3852	42
43	47.8395 7244	48.7130 9018	49.1574 7863	49.6070 3944	43
44	49.0787 7030	49.9972 4988	50.4647 1287	50.9377 5304	44
45	50.3241 6415	51.2889 0050	51.7801 1733	52.2773 3806	45
46	51.5757 8497	52.5880 8575	53.1037 4306	53.6258 5365	46
47	52.8336 6390	53.8948 4959	54.4356 4146	54.9833 5934	47
48	54.0978 3222	55.2092 3621	55.7758 6421	56.3499 1507	48
49	55.3683 2138	56.5312 9009	57.1244 6337	57.7255 8117	49
50	56.6451 6299	57.8610 5595	58.4814 9126	59.1104 1837	50

Amount of 1 per Annum at Compound Interest

$$s_{\overline{n|}} = [(1+i)^n - 1]/i$$

n	$\frac{1}{2}\%$	$\frac{7}{12}\%$	$\frac{5}{8}\%$	$\frac{2}{3}\%$	n
51	57.9283 8880	59.1985 7877	59.8470 0058	60.5044 8783	51
52	59.2180 3075	60.5439 0381	61.2210 4434	61.9078 5108	52
53	60.5141 2090	61.8970 7659	62.6036 7586	63.3205 7009	53
54	61.8166 9150	63.2581 4287	63.9949 4884	64.7427 0722	54
55	63.1257 7496	64.6271 4870	65.3949 1727	66.1743 2527	55
56	64.4414 0384	66.0041 4040	66.8036 3550	67.6154 8744	56
57	65.7636 1086	67.3891 6455	68.2211 5822	69.0662 5736	57
58	67.0924 2891	68.7822 6801	69.6475 4046	70.5266 9907	58
59	68.4278 9105	70.1834 9791	71.0828 3759	71.9968 7706	59
60	69.7700 3051	71.5929 0165	72.5271 0532	73.4768 5625	60
61	71.1188 8066	73.0105 2691	73.9803 9973	74.9667 0195	61
62	72.4744 7507	74.4364 2165	75.4427 7723	76.4664 7997	62
63	73.8368 4744	75.8706 3411	76.9142 9459	77.9762 5650	63
64	75.2060 3168	77.3132 1281	78.3950 0893	79.4960 9821	64
65	76.5820 6184	78.7642 0655	79.8849 7774	81.0260 7220	65
66	77.9649 7215	80.2236 6442	81.3842 5885	82.5662 4601	66
67	79.3547 9701	81.6916 3579	82.8929 1046	84.1166 8765	67
68	80.7515 7099	83.1681 7034	84.4109 9115	85.6774 6557	68
69	82.1553 2885	84.6533 1800	85.9385 5985	87.2486 4867	69
70	83.5661 0549	86.1471 2902	87.4756 7585	88.8303 0633	70
71	84.9839 3602	87.6496 5394	89.0223 9882	90.4225 0837	71
72	86.4088 5570	89.1609 4359	90.5787 8882	92.0253 2510	72
73	87.8408 9998	90.6810 4909	92.1449 0625	93.6388 2726	73
74	89.2801 0448	92.2100 2188	93.7208 1191	95.2630 8611	74
75	90.7265 0500	93.7479 1367	95.3065 6698	96.8981 7335	75
76	92.1801 3752	95.2947 7650	96.9022 3303	98.5441 6118	76
77	93.6410 3821	96.8506 6270	98.5078 7198	100.2011 2225	77
78	95.1092 4340	98.4156 2490	100.1235 4618	101.8691 2973	78
79	96.5847 8962	99.9897 1604	101.7493 1835	103.5482 5726	79
80	98.0677 1357	101.5729 8938	103.3852 5159	105.2385 7898	80
81	99.5580 5214	103.1654 9849	105.0314 0941	106.9401 6950	81
82	101.0558 4240	104.7672 9723	106.6878 5572	108.6531 0397	82
83	102.5611 2161	106.3784 3980	108.3546 5482	110.3774 5799	83
84	104.0739 2722	107.9989 8070	110.0318 7141	112.1133 0771	84
85	105.5942 9685	109.6289 7475	111.7195 7061	113.8607 2977	85
86	107.1222 6834	111.2684 7710	113.4178 1792	115.6198 0130	86
87	108.6578 7968	112.9175 4322	115.1266 7928	117.3905 9997	87
88	110.2011 6908	114.5762 2889	116.8462 2103	119.1732 0397	88
89	111.7521 7492	116.2445 9022	118.5765 0991	120.9676 9200	89
90	113.3109 3580	117.9226 8367	120.3176 1310	122.7741 4328	90
91	114.8774 9048	119.6105 6599	122.0695 9818	124.5926 3757	91
92	116.4518 7793	121.3082 9429	123.8325 3317	126.4232 5515	92
93	118.0341 3732	123.0159 2601	125.6064 8650	128.2660 7685	93
94	119.6243 0800	124.7335 1891	127.3915 2704	130.1211 8403	94
95	121.2224 2954	126.4611 3110	129.1877 2408	131.9886 5859	95
96	122.8285 4169	128.1988 2103	130.9951 4736	133.8685 8298	96
97	124.4426 8440	129.9466 4749	132.8138 6703	135.7610 4020	97
98	126.0648 9782	131.7046 6960	134.6439 5370	137.6661 1380	98
99	127.6952 2231	133.4729 4684	136.4854 7841	139.5838 8790	99
100	129.3336 9842	135.2515 3903	138.3385 1265	141.5144 4715	100

Amount of 1 per Annum at Compound Interest

$$s_{\overline{n|}} = [(1+i)^n - 1]/i$$

n	$\frac{1}{2}\%$	$\frac{7}{12}\%$	$\frac{5}{8}\%$	$\frac{2}{3}\%$	n
101	130.9803 6692	137.0405 0634	140.2031 2836	143.4578 7680	101
102	132.6352 6875	138.8399 0929	142.0793 9791	145.4142 6264	102
103	134.2984 4509	140.6498 0876	143.9673 9414	147.3836 9106	103
104	135.9699 3732	142.4702 6598	145.8671 9036	149.3662 4900	104
105	137.6497 8701	144.3013 4253	147.7788 6030	151.3620 2399	105
106	139.3380 3594	146.1431 0036	149.7024 7817	153.3711 0415	106
107	141.0347 2612	147.9956 0178	151.6381 1866	155.3935 7818	107
108	142.7398 9975	149.8589 0946	153.5858 5690	157.4295 3537	108
109	144.4535 9925	151.7330 8643	155.5457 6851	159.4790 6560	109
110	146.1758 6725	153.6181 9610	157.5179 2956	161.5422 5937	110
111	147.9067 4658	155.5143 0225	159.5024 1662	163.6192 0777	111
112	149.6462 8032	157.4214 6901	161.4993 0673	165.7100 0249	112
113	151.3945 1172	159.3397 6091	163.5086 7739	167.8147 3584	113
114	153.1514 8428	161.2692 4285	165.5306 0663	169.9335 0074	114
115	154.9172 4170	163.2099 8010	167.5651 7292	172.0663 9075	115
116	156.6918 2791	165.1620 3832	169.6124 5525	174.2135 0002	116
117	158.4752 8704	167.1254 8354	171.6725 3310	176.3749 2335	117
118	160.2676 6348	169.1003 8219	173.7454 8643	178.5507 5618	118
119	162.0690 0180	171.0868 0109	175.8313 9572	180.7410 9455	119
120	163.8793 4681	173.0848 0743	177.9303 4194	182.9400 3518	120
121	165.6987 4354	175.0944 6881	180.0424 0658	185.1656 7542	121
122	167.5272 3726	177.1158 5321	182.1676 7162	187.4001 1325	122
123	169.3648 7344	179.1490 2902	184.3062 1957	189.6494 4734	123
124	171.2116 9781	181.1940 6502	186.4581 3344	191.9137 7699	124
125	173.0677 5630	183.2510 3040	188.6234 9677	194.1932 0217	125
126	174.9330 9508	185.3199 9474	190.8023 9363	196.4878 2352	126
127	176.8077 6056	187.4010 2805	192.9949 0859	198.7977 4234	127
128	178.6917 9936	189.4942 0071	195.2011 2677	201.1230 6062	128
129	180.5852 5836	191.5995 8355	197.4211 3381	203.4638 8103	129
130	182.4881 8465	193.7172 4778	199.6550 1589	205.8203 0690	130
131	184.4006 2557	195.8472 6506	201.9028 5974	208.1924 4228	131
132	186.3226 2870	197.9897 0744	204.1647 5262	210.5803 9189	132
133	188.2542 4184	200.1446 4740	206.4407 8232	212.9842 6117	133
134	190.1955 1305	202.3121 5785	208.7310 3721	215.4041 5625	134
135	192.1464 9062	204.4923 1210	211.0356 0619	217.8401 8396	135
136	194.1072 2307	206.6851 8392	213.3545 7873	220.2924 5185	136
137	196.0777 5919	208.8908 4749	215.6880 4485	222.7610 6820	137
138	198.0581 4798	211.1093 7744	218.0360 9513	225.2461 4198	138
139	200.0484 3872	213.3408 4881	220.3988 2072	227.7477 8293	139
140	202.0486 8092	215.5853 3709	222.7763 1335	230.2661 0148	140
141	204.0589 2432	217.8429 1822	225.1686 6531	232.8012 0883	141
142	206.0792 1894	220.1136 6858	227.5759 6947	235.3532 1688	142
143	208.1096 1504	222.3976 6498	229.9983 1928	237.9222 3833	143
144	210.1501 6311	224.6949 8469	232.4358 0878	240.5083 8659	144
145	212.2009 1393	227.0057 0544	234.8885 3258	243.1117 7583	145
146	214.2619 1850	229.3299 0538	237.3565 8591	245.7325 2100	146
147	216.3332 2809	231.6676 6317	239.8400 6457	248.3707 3781	147
148	218.4148 9423	234.0190 5787	242.3390 6497	251.0265 4273	148
149	220.5069 6870	236.3841 6904	244.8536 8413	253.7000 5301	149
150	222.6095 0354	238.7630 7669	247.3840 1966	256.3913 8670	150

Amount of 1 per Annum at Compound Interest

$$s_{\overline{n}|} = [(1+i)^n - 1]/i$$

n	$\frac{1}{2}\%$	$\frac{7}{12}\%$	$\frac{5}{8}\%$	$\frac{2}{3}\%$	n
151	224.7225 5106	241.1558 6130	249.9301 6978	259.1006 6261	151
152	226.8461 6382	243.5626 0383	252.4922 3334	261.8280 0036	152
153	228.9803 9464	245.9833 8568	255.0703 0980	264.5735 2036	153
154	231.1252 9661	248.4182 8877	257.6644 9923	267.3373 4383	154
155	233.2809 2309	250.8673 9545	260.2749 0235	270.1195 9279	155
156	235.4473 2771	253.3307 8859	262.9016 2049	272.9203 9008	156
157	237.6245 6435	255.8085 5153	265.5447 5562	275.7398 5934	157
158	239.8126 8717	258.3007 6808	268.2044 1035	278.5781 2507	158
159	242.0117 5060	260.8075 2256	270.8806 8791	281.4353 1257	159
160	244.2218 0936	263.3288 9977	273.5736 9221	284.3115 4799	160
161	246.4429 1840	265.8649 8502	276.2835 2779	287.2069 5831	161
162	248.6751 3300	268.4158 6410	279.0102 9983	290.1216 7136	162
163	250.9185 0866	270.9816 2331	281.7541 1421	293.0558 1584	163
164	253.1731 0121	273.5623 4944	284.5150 7742	296.0095 2128	164
165	255.4389 6671	276.1581 2982	287.2932 9666	298.9829 1809	165
166	257.7161 6154	278.7690 5224	290.0888 7976	301.9761 3754	166
167	260.0047 4235	281.3952 0504	292.9019 3526	304.9893 1179	167
168	262.3047 6606	284.0366 7707	295.7325 7235	308.0225 7387	168
169	264.6162 8989	286.6935 5769	298.5809 0093	311.0760 5770	169
170	266.9393 7134	289.3659 3678	301.4470 3156	314.1498 9808	170
171	269.2740 6820	292.0539 0474	304.3310 7551	317.2442 3073	171
172	271.6204 3854	294.7575 5252	307.2331 4473	320.3591 9227	172
173	273.9785 4073	297.4769 7158	310.1533 5189	323.4949 2022	173
174	276.3484 3344	300.2122 5391	313.0918 1033	326.6515 5302	174
175	278.7301 7561	302.9634 9206	316.0486 3415	329.8292 3004	175
176	281.1238 2648	305.7307 7910	319.0239 3811	333.0280 9158	176
177	283.5294 4562	308.5142 0864	322.0178 3773	336.2482 7885	177
178	285.9470 9284	311.3138 7486	325.0304 4921	339.4899 3405	178
179	288.3768 2831	314.1298 7246	328.0618 8952	342.7532 0027	179
180	290.8187 1245	316.9622 9672	331.1122 7633	346.0382 2161	180
181	293.2728 0601	319.8112 4345	334.1817 2806	349.3451 4309	181
182	295.7391 7004	322.6768 0904	337.2703 6386	352.6741 1071	182
183	298.2178 6589	325.5590 9042	340.3783 0363	356.0252 7144	183
184	300.7089 5522	328.4581 8512	343.5056 6803	359 3987 7325	184
185	303.2125 0000	331.3741 9120	346.6525 7845	362.7947 6508	185
186	305.7285 6250	334.3072 0731	349.8191 5707	366.2133 9684	186
187	308.2572 0531	337.2573 3269	353.0055 2680	369.6548 1949	187
188	310.7984 9134	340.2246 6713	356.2118 1134	373.1191 8495	188
189	313.3524 8379	343.2093 1102	359.4381 3516	376.6066 4618	189
190	315.9192 4621	346.2113 6533	362.6846 2351	380.1173 5716	190
191	318.4988 4244	349.2309 3163	365.9514 0241	383.6514 7287	191
192	321.0913 3666	352.2681 1207	369.2385 9867	387.2091 4936	192
193	323.6967 9334	355.3230 0939	372.5463 3991	390.7905 4369	193
194	326.3152 7731	358.3957 2694	375.8747 5454	394.3958 1398	194
195	328.9468 5369	361.4863 6868	379.2239 7175	398.0251 1941	195
196	331.5915 8796	364.5950 3917	382.5941 2158	401.6786 2020	196
197	334.2495 4590	367.7218 4356	385.9853 3484	405.3564 7767	197
198	336.9207 9363	370.8668 8765	389.3977 4318	409.0588 5419	198
199	339.6053 9760	374.0302 7783	392.8314 7907	412.7859 1322	199
200	342.3034 2459	377.2121 2111	396.2866 7582	416.5378 1930	200

Amount of 1 per Annum at Compound Interest

$$s_{\overline{n}|}=[(1+i)^n-1]/i$$

n	¾%	⅞%	1%	1⅛%	n
1	1.0000 0000	1.0000 0000	1.0000 0000	1.0000 0000	1
2	2.0075 0000	2.0087 5000	2.0100 0000	2.0112 5000	2
3	3.0225 5625	3.0263 2656	3.0301 0000	3.0338 7656	3
4	4.0452 2542	4.0528 0692	4.0604 0100	4.0680 0767	4
5	5.0755 6461	5.0882 6898	5.1010 0501	5.1137 7276	5
6	6.1136 3135	6.1327 9133	6.1520 1506	6.1713 0270	6
7	7.1594 8358	7.1864 5326	7.2135 3521	7.2407 2986	7
8	8.2131 7971	8.2493 3472	8.2856 7056	8.3221 8807	8
9	9.2747 7856	9.3215 1640	9.3685 2727	9.4158 1269	9
10	10.3443 3940	10.4030 7967	10.4622 1254	10.5217 4058	10
11	11.4219 2194	11.4941 0662	11.5668 3467	11.6401 1016	11
12	12.5075 8636	12.5946 8005	12.6825 0301	12.7710 6140	12
13	13.6013 9325	13.7048 8350	13.8093 2804	13.9147 3584	13
14	14.7034 0370	14.8248 0123	14.9474 2132	15.0712 7662	14
15	15.8136 7923	15.9545 1824	16.0968 9554	16.2408 2848	15
16	16.9322 8183	17.0941 2028	17.2578 6449	17.4235 3780	16
17	18.0592 7394	18.2436 9383	18.4304 4314	18.6195 5260	17
18	19.1947 1849	19.4033 2615	19.6147 4757	19.8290 2257	18
19	20.3386 7888	20.5731 0526	20.8108 9504	21.0520 9907	19
20	21.4912 1897	21.7531 1993	22.0190 0399	22.2889 3519	20
21	22.6524 0312	22.9434 5973	23.2391 9403	23.5396 8571	21
22	23.8222 9614	24.1442 1500	24.4715 8598	24.8045 0717	22
23	25.0009 6336	25.3554 7688	25.7163 0183	26.0835 5788	23
24	26.1884 7059	26.5773 3730	26.9734 6485	27.3769 9790	24
25	27.3848 8412	27.8098 8900	28.2431 9950	28.6849 8913	25
26	28.5902 7075	29.0532 2553	29.5256 3150	30.0076 9526	26
27	29.8046 9778	30.3074 4126	30.8208 8781	31.3452 8183	27
28	31.0282 3301	31.5726 3137	32.1290 9669	32.6979 1625	28
29	32.2609 4476	32.8488 9189	33.4503 8766	34.0657 6781	29
30	33.5029 0184	34.1363 1970	34.7848 9153	35.4490 0769	30
31	34.7541 7361	35.4350 1249	36.1327 4045	36.8478 0903	31
32	36.0148 2991	36.7450 6885	37.4940 6785	38.2623 4688	32
33	37.2849 4113	38.0665 8820	38.8690 0853	39.6927 9829	33
34	38.5645 7819	39.3996 7085	40.2576 9862	41.1393 4227	34
35	39.8538 1253	40.7444 1797	41.6602 7560	42.6021 5987	35
36	41.1527 1612	42.1009 3163	43.0768 7836	44.0814 3417	36
37	42.4613 6149	43.4693 1478	44.5076 4714	45.5773 5030	37
38	43.7798 2170	44.8496 7128	45.9527 2361	47.0900 9549	38
39	45.1081 7037	46.2421 0591	47.4122 5085	48.6198 5906	39
40	46.4464 8164	47.6467 2433	48.8863 7336	50.1668 3248	40
41	47.7948 3026	49.0636 3317	50.3752 3709	51.7312 0934	41
42	49.1532 9148	50.4929 3996	51.8789 8946	53.3131 8545	42
43	50.5219 4117	51.9347 5319	53.3977 7936	54.9129 5879	43
44	51.9008 5573	53.3891 8228	54.9317 5715	56.5307 2957	44
45	53.2901 1215	54.8563 3762	56.4810 7472	58.1667 0028	45
46	54.6897 8799	56.3363 3058	58.0458 8547	59.8210 7566	46
47	56.0999 6140	57.8292 7347	59.6263 4432	61.4940 6276	47
48	57.5207 1111	59.3352 7961	61.2226 0777	63.1858 7097	48
49	58.9521 1644	60.8544 6331	62.8348 3385	64.8967 1201	49
50	60.3942 5732	62.3869 3986	64.4631 8218	66.6268 0002	50

Amount of 1 per Annum at Compound Interest

$$s_{\overline{n|}}=[(1+i)^n-1]/i$$

n	¾%	⅞%	1%	1⅛%	n
51	61.8472 1424	63.9328 2559	66.1078 1401	68.3763 5152	51
52	63.3110 6835	65.4922 3781	67.7688 9215	70.1455 8548	52
53	64.7859 0136	67.0652 9489	69.4465 8107	71.9347 2332	53
54	66.2717 9562	68.6521 1622	71.1410 4688	73.7439 8895	54
55	67.7688 3409	70.2528 2224	72.8524 5735	75.5736 0883	55
56	69.2771 0035	71.8675 3443	74.5809 8192	77.4238 1193	56
57	70.7966 7860	73.4963 7536	76.3267 9174	79.2948 2981	57
58	72.3276 5369	75.1394 6864	78.0900 5966	81.1868 9665	58
59	73.8701 1109	76.7969 3900	79.8709 6025	83.1002 4923	59
60	75.4241 3693	78.4689 1221	81.6696 6986	85.0351 2704	60
61	76.9898 1795	80.1555 1519	83.4863 6655	86.9917 7222	61
62	78.5672 4159	81.8568 7595	85.3212 3022	88.9704 2966	62
63	80.1564 9590	83.5731 2362	87.1744 4252	90.9713 4699	63
64	81.7576 6962	85.3043 8845	89.0461 8695	92.9947 7464	64
65	83.3708 5214	87.0508 0185	90.9366 4882	95.0409 6586	65
66	84.9961 3353	88.8124 9636	92.8460 1531	97.1101 7672	66
67	86.6336 0453	90.5896 0571	94.7744 7546	99.2026 6621	67
68	88.2833 5657	92.3822 6476	96.7222 2021	101.3186 9621	68
69	89.9454 8174	94.1906 0957	98.6894 4242	103.4585 3154	69
70	91.6200 7285	96.0147 7741	100.6763 3684	105.6224 4002	70
71	93.3072 2340	97.8549 0671	102.6831 0021	107.8106 9247	71
72	95.0070 2758	99.7111 3714	104.7099 3121	110.0235 6276	72
73	96.7195 8028	101.5836 0959	106.7570 3052	112.2613 2784	73
74	98.4449 7714	103.4724 6618	108.8246 0083	114.5242 6778	74
75	100.1833 1446	105.3778 5025	110.9128 4684	116.8126 6579	75
76	101.9346 8932	107.2999 0644	113.0219 7530	119.1268 0828	76
77	103.6991 9949	109.2387 8063	115.1521 9506	121.4669 8487	77
78	105.4769 4349	111.1946 1996	117.3037 1701	123.8334 8845	78
79	107.2680 2056	113.1675 7288	119.4767 5418	126.2266 1520	79
80	109.0725 3072	115.1577 8914	121.6715 2172	128.6466 6462	80
81	110.8905 7470	117.1654 1980	123.8882 3694	131.0939 3960	81
82	112.7222 5401	119.1906 1722	126.1271 1931	133.5687 4642	82
83	114.5676 7091	121.2335 3512	128.3883 9050	136.0713 9481	83
84	116.4269 2845	123.2943 2855	130.6722 7440	138.6021 9801	84
85	118.3001 3041	125.3731 5393	132.9789 9715	141.1614 7273	85
86	120.1873 8139	127.4701 6903	135.3087 8712	143.7495 3930	86
87	122.0887 8675	129.5855 3301	137.6618 7499	146.3667 2162	87
88	124.0044 5265	131.7194 0642	140.0384 9374	149.0133 4724	88
89	125.9344 8604	133.8719 5123	142.4388 7868	151.6897 4739	89
90	127.8789 9469	136.0433 3080	144.8632 6746	154.3962 5705	90
91	129.8380 8715	138.2337 0994	147.3119 0014	157.1332 1494	91
92	131.8118 7280	140.4432 5491	149.7850 1914	159.9009 6361	92
93	133.8004 6185	142.6721 3339	152.2828 6933	162.6998 4945	93
94	135.8039 6531	144.9205 1455	154.8056 9803	165.5302 2276	94
95	137.8224 9505	147.1885 6906	157.3537 5501	168.3924 3776	95
96	139.8561 6377	149.4764 6903	159.9272 9256	171.2868 5269	96
97	141.9050 8499	151.7843 8813	162.5265 6548	174.2138 2978	97
98	143.9693 7313	154.1125 0153	165.1518 3114	177.1737 3537	98
99	146.0491 4343	156.4609 8592	167.8033 4945	180.1669 3989	99
100	148.1445 1201	158.8300 1955	170.4813 8294	183.1938 1796	100

Amount of 1 per Annum at Compound Interest

$$s_{\overline{n|}} = [(1+i)^n - 1]/i$$

n	¾%	⅞%	1%	1⅛%	n
101	150.2555 9585	161 2197 8222	173.1861 9677	186.2547 4842	101
102	152.3825 1281	163.6304 5532	175.9180 5874	189.3501 1434	102
103	154.5253 8166	166.0622 2180	178.6772 3933	192.4803 0312	103
104	156.6843 2202	168.5122 6624	181.4640 1172	195.6457 0653	104
105	158.8594 5444	170.9897 7482	184.2786 5184	198.8467 2073	105
106	161.0509 0035	173.4859 3535	187.1214 3836	202.0837 4634	106
107	163.2587 8210	176.0039 3728	189.9926 5274	205.3571 8849	107
108	165.4832 2296	178.5439 7174	192.8925 7927	208.6674 5686	108
109	167.7243 4714	181.1062 3149	195.8215 0506	212.0149 6575	109
110	169.9822 7974	183.6909 1101	198.7797 2011	215.4001 3411	110
111	172.2571 4684	186.2982 0648	201.7675 1731	218.8233 8562	111
112	174.5490 7544	188.9283 1579	204.7851 9248	222.2851 4871	112
113	176.8581 9351	191.5814 3855	207.8330 4441	225.7858 5663	113
114	179.1846 2996	194.2577 7614	210.9113 7485	229.3259 4752	114
115	181.5285 1468	196.9575 3168	214.0204 8860	232.9058 6443	115
116	183.8899 7854	199.6809 1009	217.1606 9349	236.5260 5540	116
117	186.2691 5338	202.4281 1805	220.3323 0042	240.1869 7352	117
118	188.6661 7203	205.1993 6408	223.5356 2343	243.8890 7698	118
119	191.0811 6832	207.9948 5852	226.7709 7966	247.6328 2909	119
120	193.5142 7708	210.8148 1353	230.0386 8946	251.4186 9842	120
121	195,9656 3416	213.6594 4315	233.3390 7635	255.2471 5878	121
122	198.4353 7642	216.5289 6328	236.6724 6712	259.1186 8931	122
123	200.9236 4174	219.4235 9170	240.0391 9179	263.0337 7457	123
124	203.4305 6905	222.3435 4813	243.4395 8370	266.9929 0453	124
125	205,9562 9832	225.2890 5418	246.8739 7954	270.9965 7471	125
126	208.5009 7056	228.2603 3340	250.3427 1934	275.0452 8617	126
127	211.0647 2784	231.2576 1132	253.8461 4653	279.1395 4564	127
128	213.6477 1330	234.2811 1542	257.3846 0800	283.2798 6553	128
129	216.2500 7115	237.3310 7518	260.9584 5408	287.4667 6402	129
130	218.8719 4668	240.4077 2209	264.5680 3862	291.7007 6511	130
131	221.5134 8628	243.5112 8965	268.2137 1900	295.9823 9872	131
132	224.1748 3743	246.6420 1344	271.8958 5619	300.3122 0071	132
133	226.8561 4871	249.8001 3106	275.6148 1475	304.6907 1296	133
134	229.5575 6982	252.9858 8220	279.3709 6290	309.1184 8349	134
135	232.2792 5160	256.1995 0867	283.1646 7253	313.5960 6643	135
136	235.0213 4598	259.4412 5437	286.9963 1926	318.1240 2217	136
137	237.7840 0608	262.7113 6535	290.8662 8245	322.7029 1742	137
138	240.5673 8612	266.0100 8980	294.7749 4527	327.3333 2524	138
139	243.3716 4152	269.3376 7808	298.7226 9473	332.0158 2515	139
140	246.1969 2883	272.6943 8276	302.7099 2167	336.7510 0318	140
141	249.0434 0580	276.0804 5861	306.7370 2089	341.5394 5197	141
142	251.9112 3134	279.4961 6263	310.8043 9110	346.3817 7081	142
143	254.8005 6558	282.9417 5405	314.9124 3501	351.2785 6573	143
144	257.7115 6982	286.4174 9440	319.0615 5936	356.2304 4959	144
145	260.6444 0659	289.9236 4747	323.2521 7495	361.2380 4215	145
146	263.5992 3964	293.4604 7939	327.4846 9670	366.3019 7012	146
147	266.5762 3394	297.0282 5858	331.7595 4367	371.4228 6729	147
148	269.5755 5569	300.6272 5585	336.0771 3911	376.6013 7454	148
149	272.5973 7236	304.2577 4433	340.4379 1050	381.8381 4001	149
150	275.6418 5265	307.9199 9960	344.8422 8960	387.1338 1908	150

Amount of 1 per Annum at Compound Interest

$$s_{\overline{n|}}=[(1+i)^n-1]/i$$

n	¾%	⅞%	1%	1⅛%	n
151	278.7091 6655	311.6142 9959	349.2907 1250	392.4890 7455	151
152	281.7994 8530	315.3409 2472	353.7836 1962	397.9045 7664	152
153	284.9129 8144	319.1001 5781	358.3214 5582	403.3810 0312	153
154	288.0498 2880	322.8922 8419	362.9046 7038	408.9190 3941	154
155	291.2102 0251	326.7175 9167	367.5337 1708	414.5193 7860	155
156	294.3942 7903	330.5763 7060	372.2090 5425	420.1827 2161	156
157	297.6022 3613	334.4689 1384	376.9311 4480	425.9097 7723	157
158	300.8342 5290	338.3955 1684	381.7004 5624	431.7012 6222	158
159	304.0905 0979	342.3564 7761	386.5174 6081	437.5579 0142	159
160	307.3711 8862	346.3520 9679	391.3826 3541	443.4804 2781	160
161	310.6764 7253	350.3826 7764	396.2964 6177	449.4695 8263	161
162	314.0065 4608	354.4485 2607	401.2594 2639	455.5261 1543	162
163	317.3615 9517	358.5499 5067	406.2720 2065	461.6507 8423	163
164	320.7418 0714	362.6872 6274	411.3347 4086	467.8443 5555	164
165	324.1473 7069	366.8607 7629	416.4480 8826	474.1076 0455	165
166	327.5784 7597	371.0708 0808	421.6125 6915	480.4413 1510	166
167	331.0353 1454	375.3176 7765	426.8286 9484	486.8462 7990	167
168	334.5180 7940	379.6017 0733	432.0969 8179	493.3233 0055	168
169	338.0269 6499	383.9232 2227	437.4179 5161	499.8731 8768	169
170	341.5621 6723	388.2825 5046	442.7921 3112	506.4967 6104	170
171	345.1238 8349	392.6800 2278	448.2200 5243	513.1948 4960	171
172	348.7123 1261	397.1159 7298	453.7022 5296	519.9682 9166	172
173	352.3276 5496	401.5907 3774	459.2392 7549	526.8179 3494	173
174	355.9701 1237	406.1046 5670	464.8316 6824	533.7446 3671	174
175	359.6398 8821	410.6580 7245	470.4799 8492	540.7492 6387	175
176	363.3371 8737	415.2513 3058	476.1847 8477	547.8326 9309	176
177	367.0622 1628	419.8847 7972	481.9466 3262	554.9958 1089	177
178	370.8151 8290	424.5587 7154	487.7660 9895	562.2395 1376	178
179	374.5962 9677	429.2736 6080	493.6437 5994	569.5647 0829	179
180	378.4057 6900	434.0298 0533	499.5801 9754	576.9723 1126	180
181	382.2438 1226	438.8275 6612	505.5759 9951	584.4632 4976	181
182	386.1106 4086	443.6673 0733	511.6317 5951	592.0384 6132	182
183	390.0064 7066	448.5493 9627	517.7480 7710	599.6988 9401	183
184	393.9315 1919	453.4742 0348	523.9255 5787	607.4455 0657	184
185	397.8860 0559	458.4421 0276	530.1648 1345	615.2792 6852	185
186	401.8701 5063	463.4534 7116	536.4664 6159	623.2011 6029	186
187	405.8841 7676	468.5086 8904	542.8311 2620	631.2121 7334	187
188	409.9283 0808	473.6081 4007	549.2594 3746	639.3133 1029	188
189	414.0027 7039	478.7522 1129	555.7520 3184	647.5055 8503	189
190	418.1077 9117	483.9412 9314	562.3095 5216	655.7900 2286	190
191	422.2435 9961	489.1757 7946	568.9326 4768	664.1676 6062	191
192	426.4104 2660	494.4560 6753	575.6219 7415	672.6395 4680	192
193	430.6085 0480	499.7825 5812	582.3781 9390	681.2067 4170	193
194	434.8380 6859	505.1556 5550	589.2019 7584	689.8703 1755	194
195	439.0993 5410	510.5757 6749	596.0939 9559	698.6313 5862	195
196	443.3925 9926	516.0433 0545	603.0549 3555	707.4909 6140	196
197	447.7180 4375	521.5586 8437	610.0854 8490	716.4502 3472	197
198	452.0759 2908	527.1223 2286	617.1863 3975	725.5102 9986	198
199	456.4664 9855	532.7346 4319	624.3582 0315	734.6722 9073	199
200	460.8899 9729	538.3960 7131	631.6017 8518	743.9373 5401	200

Amount of 1 per Annum at Compound Interest

$$s_{\overline{n|}} = [(1+i)^n - 1]/i$$

n	1¼%	1⅜%	1½%	1¾%	*n*
1	1.0000 0000	1.0000 0000	1.0000 0000	1.0000 0000	1
2	2.0125 0000	2.0137 5000	2.0150 0000	2.0175 0000	2
3	3.0376 5625	3.0414 3906	3.0452 2500	3.0528 0625	3
4	4.0756 2695	4.0832 5885	4.0909 0338	4.1062 3036	4
5	5.1265 7229	5.1394 0366	5.1522 6693	5.1780 8938	5
6	6.1906 5444	6.2100 7046	6.2295 5093	6.2687 0596	6
7	7.2680 3762	7.2954 5893	7.3229 9419	7.3784 0831	7
8	8.3588 8809	8.3957 7149	8.4328 3911	8.5075 3045	8
9	9.4633 7420	9.5112 1335	9.5593 3169	9.6564 1224	9
10	10.5816 6637	10.6419 9253	10.7027 2167	10.8253 9945	10
11	11.7139 3720	11.7883 1993	11.8632 6249	12.0148 4394	11
12	12.8603 6142	12.9504 0933	13.0412 1143	13.2251 0371	12
13	14.0211 1594	14.1284 7745	14.2368 2960	14.4565 4303	13
14	15.1963 7988	15.3227 4402	15.4503 8205	15.7095 3253	14
15	16.3863 3463	16.5334 3175	16.6821 3778	16.9844 4935	15
16	17.5911 6382	17.7607 6644	17.9323 6984	18.2816 7721	16
17	18.8110 5336	19.0049 7697	19.2013 5539	19.6016 0656	17
18	20.0461 9153	20.2662 9541	20.4893 7572	20.9446 3468	18
19	21.2967 6893	21.5449 5697	21.7967 1636	22.3111 6578	19
20	22.5629 7854	22.8412 0013	23.1236 6710	23.7016 1119	20
21	23.8450 1577	24.1552 6663	24.4705 2211	25.1163 8938	21
22	25.1430 7847	25.4874 0155	25.8375 7994	26.5559 2620	22
23	26.4573 6695	26.8378 5332	27.2251 4364	28.0206 5490	23
24	27.7880 8403	28.2068 7380	28.6335 2080	29.5110 1637	24
25	29.1354 3508	29.5947 1832	30.0630 2361	31.0274 5915	25
26	30.4996 2802	31.0016 4569	31.5139 6896	32.5704 3969	26
27	31.8808 7337	32.4279 1832	32.9866 7850	34.1404 2238	27
28	33.2793 8429	33.8738 0220	34.4814 7867	35.7378 7977	28
29	34.6953 7659	35.3395 6698	35.9987 0085	37.3632 9267	29
30	36.1290 6880	36.8254 8602	37.5386 8137	39.0171 5029	30
31	37.5806 8216	38.3318 3646	39.1017 6159	40.6999 5042	31
32	39.0504 4069	39.8588 9921	40.6882 8801	42.4121 9955	32
33	40.5385 7120	41.4069 5907	42.2986 1233	44.1544 1305	33
34	42.0453 0334	42.9763 0476	43.9330 9152	45.9271 1527	34
35	43.5708 6963	44.5672 2895	45.5920 8789	47.7308 3979	35
36	45.1155 0550	46.1800 2835	47.2759 6921	49.5661 2949	36
37	46.6794 4932	47.8150 0374	48.9851 0874	51.4335 3675	37
38	48.2926 4243	49.4724 6004	50.7198 8538	53.3336 2365	38
39	49.8862 2921	51.1527 0636	52.4806 8366	55.2669 6206	39
40	51.4895 5708	52.8560 5608	54.2678 9391	57.2341 3390	40
41	53.1331 7654	54.5828 2685	56.0819 1232	59.2357 3124	41
42	54.7973 4125	56.3333 4072	57.9231 4100	61.2723 5654	42
43	56.4823 0801	58.1079 2415	59.7919 8812	63.3446 2278	43
44	58.1883 3687	59.9069 0811	61.6888 6794	65.4531 5367	44
45	59.9156 9108	61.7306 2810	63.6142 0096	67.5985 8386	45
46	61.6646 3721	63.5794 2423	65.5684 1398	69.7815 5908	46
47	63.4354 4518	65.4536 4131	67.5519 4018	72.0027 3637	47
48	65.2283 8824	67.3536 2888	69.5652 1929	74.2627 8425	48
49	67.0437 4310	69.2797 4128	71.6086 9758	76.5623 8298	49
50	68.8817 8989	71.2323 3772	73.6828 2804	78.9022 2468	50

Amount of 1 per Annum at Compound Interest

$$s_{\overline{n|}} = [(1+i)^n - 1]/i$$

n	1¼%	1⅜%	1½%	1¾%	n
51	70.7428 1226	73.2117 8237	75.7880 7046	81.2830 1361	51
52	72.6270 9741	75.2184 4437	77.9248 9152	83.7054 6635	52
53	74.5349 3613	77.2526 9798	80.0937 6489	86.1703 1201	53
54	76.4666 2283	79.3149 2258	82.2951 7136	88.6782 9247	54
55	78.4224 5562	81.4055 0277	84.5295 9893	91.2301 6259	55
56	80.4027 3631	83.5248 2843	86.7975 4292	93.8266 9043	56
57	82.4077 7052	85.6732 9482	89.0995 0606	96.4686 5752	57
58	84.4378 6765	87.8513 0262	91.4359 9865	99.1568 5902	58
59	86.4933 4099	90.0592 5804	93.8075 3863	101.8921 0405	59
60	88.5745 0776	92.2975 7283	96.2146 5171	104.6752 1588	60
61	90.6816 8910	94.5666 6446	98.6578 7149	107.5070 3215	61
62	92.8152 1022	96.8669 5610	101.1377 3956	110.3884 0522	62
63	94.9754 0034	99.1988 7674	103.6548 0565	113.3202 0231	63
64	97.1625 9285	101.5628 6130	106.2096 2774	116.3033 0585	64
65	99.3771 2526	103.9593 5064	108.8027 7215	119.3386 1370	65
66	101.6193 3933	106.3887 9171	111.4348 1374	122.4270 3944	66
67	103.8895 8107	108.8516 3760	114.1063 3594	125.5695 1263	67
68	106.1882 0083	111.3483 4761	116.8179 3098	128.7669 7910	68
69	108.5155 5334	113.8793 8739	119.5701 9995	132.0204 0124	69
70	110.8719 9776	116.4452 2897	122.3637 5295	135.3307 5826	70
71	113.2578 9773	119.0463 5087	125.1992 0924	138.6990 4653	71
72	115.6736 2145	121.6832 3819	128.0771 9738	142.1262 7984	72
73	118.1195 4172	124.3563 8272	130.9983 5534	145.6134 8974	73
74	120.5960 3599	127.0662 8298	133.9633 3067	149.1617 2581	74
75	123.1034 8644	129.8134 4437	136.9727 8063	152.7720 5601	75
76	125.6422 8002	132.5983 7923	140.0273 7234	156.4455 6699	76
77	128.2128 0852	135.4216 0695	143.1277 8292	160.1833 6441	77
78	130.8154 6863	138.2836 5404	146.2746 9967	163.9865 7329	78
79	133.4506 6199	141.1850 5429	149.4688 2016	167.8563 3832	79
80	136.1187 9526	144.1263 4878	152.7108 5247	171.7938 2424	80
81	138.8202 8020	147.1080 8608	156.0015 1525	175.8002 1617	81
82	141.5555 3370	150.1308 2226	159.3415 3798	179.8767 1995	82
83	144.3249 7787	153.1951 2107	162.7316 6105	184.0245 6255	83
84	147.1290 4010	156.3015 5398	166.1726 3597	188.2449 9239	84
85	149.9681 5310	159.4507 0035	169.6652 2551	192.5392 7976	85
86	152.8427 5501	162.6431 4748	173.2102 0389	196.9087 1716	86
87	155.7532 8945	165.8794 9076	176.8083 5695	201.3546 1971	87
88	158.7002 0557	169.1603 3375	180.4604 8230	205.8783 2555	88
89	161.6839 5814	172.4862 8834	184.1673 8954	210.4811 9625	89
90	164.7050 0762	175.8579 7481	187.9299 0038	215.1646 1718	90
91	167.7638 2021	179.2760 2196	191.7488 4889	219.9299 9798	91
92	170.8608 6796	182.7410 6726	195.6250 8162	224.7787 7295	92
93	173.9966 2881	186.2537 5694	199.5594 5784	229.7124 0148	93
94	177.1715 8667	189.8147 4610	203.5528 4971	234.7323 6850	94
95	180.3862 3151	193.4246 9886	207.6061 4246	239.8401 8495	95
96	183.6410 5940	197.0842 8847	211.7202 3459	245.0373 8819	96
97	186.9365 7264	200.7941 9743	215.8960 3811	250.3255 4248	97
98	190.2732 7980	204.5551 1765	220.1344 7868	255.7062 3947	98
99	193.6516 9580	208.3677 5051	224.4364 9586	261.1810 9866	99
100	197.0723 4200	212.2328 0708	228.8030 4330	266.7517 6789	100

Amount of 1 per Annum at Compound Interest

$$s_{\overline{n|}} = [(1+i)^n - 1]/i$$

n	2%	2¼%	2½%	2¾%	*n*
1	1.0000 0000	1.0000 0000	1.0000 0000	1.0000 0000	1
2	2.0200 0000	2.0225 0000	2.0250 0000	2.0275 0000	2
3	3.0604 0000	3.0680 0625	3.0756 2500	3.0832 5625	3
4	4.1216 0800	4.1370 3639	4.1525 1563	4.1680 4580	4
5	5.2040 4016	5.2301 1971	5.2563 2852	5.2826 6706	5
6	6.3081 2096	6.3477 9740	6.3877 3673	6.4279 4040	6
7	7.4342 8338	7.4906 2284	7.5474 3015	7.6047 0876	7
8	8.5829 6905	8.6591 6186	8.7361 1590	8.8138 3825	8
9	9.7546 2843	9.8539 9300	9.9545 1880	10.0562 1880	9
10	10.9497 2100	11.0757 0784	11.2033 8177	11.3327 6482	10
11	12.1687 1542	12.3249 1127	12.4834 6631	12.6444 1585	11
12	13.4120 8973	13.6022 2177	13.7955 5297	13.9921 3729	12
13	14.6803 3152	14.9082 7176	15.1404 4179	15.3769 2107	13
14	15.9739 3815	16.2437 0788	16.5189 5284	16.7997 8639	14
15	17.2934 1692	17.6091 9130	17.9319 2666	18.2617 8052	15
16	18.6392 8525	19.0053 9811	19.3802 2483	19.7639 7948	16
17	20.0120 7096	20.4330 1957	20.8647 3045	21.3074 8892	17
18	21.4123 1238	21.8927 6251	22.3863 4871	22.8934 4487	18
19	22.8405 5863	23.3853 4966	23.9460 0743	24.5230 1460	19
20	24.2973 6980	24.9115 2003	25.5446 5761	26.1973 9750	20
21	25.7833 1719	26.4720 2923	27.1832 7405	27.9178 2593	21
22	27.2989 8354	28.0676 4989	28.8628 5590	29.6855 6615	22
23	28.8449 6321	29.6991 7201	30.5844 2730	31.5019 1921	23
24	30.4218 6247	31.3674 0338	32.3490 3798	33.3682 2199	24
25	32.0302 9972	33.0731 6996	34.1577 6393	35.2858 4810	25
26	33.6709 0572	34.8173 1628	36.0117 0803	37.2562 0892	26
27	35.3443 2383	36.6007 0590	37.9120 0073	39.2807 5467	27
28	37.0512 1031	38.4242 2178	39.8598 0075	41.3609 7542	28
29	38.7922 3451	40.2887 6677	41.8562 9577	43.4984 0224	29
30	40.5680 7921	42.1952 6402	43.9027 0316	45.6946 0830	30
31	42.3794 4079	44.1446 5746	46.0002 7074	47.9512 1003	31
32	44.2270 2961	46.1379 1226	48.1502 7751	50.2698 6831	32
33	46.1115 7020	48.1760 1528	50.3540 3445	52.6522 8969	33
34	48.0338 0160	50.2599 7563	52.6128 8531	55.1002 2765	34
35	49.9944 7763	52.3908 2508	54.9282 0744	57.6154 8391	35
36	51.9943 6719	54.5696 1864	57.3014 1263	60.1999 0972	36
37	54.0342 5453	56.7974 3506	59.7339 4794	62.8554 0724	37
38	56.1149 3962	59.0753 7735	62.2272 9664	65.5839 3094	38
39	58.2372 3841	61.4045 7334	64.7829 7906	68.3874 8904	39
40	60.4019 8318	63.7861 7624	67.4025 5354	71.2681 4499	40
41	62.6100 2284	66.2213 6521	70.0876 1737	74.2280 1898	41
42	64.8622 2330	68.7113 4592	72.8398 0781	77.2692 8950	42
43	67.1594 6777	71.2573 5121	75.6608 0300	80.3941 9496	43
44	69.5026 5712	73.8606 4161	78.5523 2308	83.6050 3532	44
45	71.8927 1027	76.5225 0605	81.5161 3116	86.9041 7379	45
46	74.3305 6447	79.2442 6243	84.5540 3443	90.2940 3857	46
47	76.8171 7576	82.0272 5834	87.6678 8530	93.7771 2463	47
48	79.3535 1927	84.8728 7165	90.8595 8243	97.3559 9556	48
49	81.9405 8966	87.7825 1126	94.1310 7199	101.0332 8544	49
50	84.5794 0145	90.7576 1776	97.4843 4879	104.8117 0079	50

Amount of 1 per Annum at Compound Interest

$$s_{\overline{n}|} = [(1+i)^n - 1]/i$$

n	2%	2¼%	2½%	2¾%	*n*
51	87.2709 8948	93.7996 6416	100.9214 5751	108.6940 2256	51
52	90.0164 0927	96.9101 5661	104.4444 9395	112.6831 0818	52
53	92.8167 3746	100.0906 3513	108.0556 0629	116.7818 9365	53
54	95.6730 7221	103.3426 7442	111.7569 9645	120.9933 9573	54
55	98.5865 3365	106.6678 8460	115.5509 2136	125.3207 1411	55
56	101.5582 6432	110.0679 1200	119.4396 9440	129.7670 3375	56
57	104.5894 2961	113.5444 4002	123.4256 8676	134.3356 2718	57
58	107.6812 1820	117.0991 8992	127.5113 2893	139.0298 5692	58
59	110.8348 4257	120.7339 2169	131.6991 1215	143.8531 7799	59
60	114.0515 3942	124.4504 3493	135.9915 8995	148.8091 4038	60
61	117.3325 7021	128.2505 6972	140.3913 7970	153.9013 9174	61
62	120.6792 2161	132.1362 0754	144.9011 6419	159.1336 8002	62
63	124.0928 0604	136.1092 7221	149.5236 9330	164.5098 5622	63
64	127.5746 6216	140.1717 3083	154.2617 8563	170.0338 7726	64
65	131.1261 5541	144.3255 9477	159.1183 3027	175.7098 0889	65
66	134.7486 7852	148.5729 2066	164.0962 8853	181.5418 2863	66
67	138.4436 5209	152.9158 1137	169.1986 9574	187.5342 2892	67
68	142.2125 2513	157.3564 1713	174.4286 6314	193.6914 2021	68
69	146.0567 7563	161.8969 3651	179.7893 7971	200.0179 3427	69
70	149.9779 1114	166.5396 1758	185.2841 1421	206.5184 2746	70
71	153.9774 6937	171.2867 5898	190.9162 1706	213.1976 8422	71
72	158.0570 1875	176.1407 1106	196.6891 2249	220.0606 2054	72
73	162.2181 5913	181.1038 7705	202.6063 5055	227.1122 8760	73
74	166.4625 2231	186.1787 1429	208.6715 0931	234.3578 7551	74
75	170.7917 7276	191.3677 3536	214.8882 9705	241.8027 1709	75
76	175.2076 0821	196.6735 0941	221.2605 0447	249.4522 9181	76
77	179.7117 6038	202.0986 6337	227.7920 1709	257.3122 2983	77
78	184.3059 9558	207.6458 8329	234.4868 1751	265.3883 1615	78
79	188.9921 1549	213.3179 1567	241.3489 8795	273.6864 9485	79
80	193.7719 5780	219.1175 6877	248.3827 1265	282.2128 7345	80
81	198.6473 9696	225.0477 1407	255.5922 8047	290.9737 2747	81
82	203.6203 4490	231.1112 8763	262.9820 8748	299.9755 0498	82
83	208.6927 5180	237.3112 9160	270.5566 3966	309.2248 3137	83
84	213.8666 0683	243.6507 9567	278.3205 5566	318.7285 1423	84
85	219.1439 3897	250.1329 3857	286.2785 6955	328.4935 4837	85
86	224.5268 1775	256.7609 2969	294.4355 3379	338.5271 2095	86
87	230.0173 5411	263.5380 5060	302.7964 2213	348.8366 1678	87
88	235.6177 0119	270.4676 5674	311.3663 3268	359.4296 2374	88
89	241.3300 5521	277.5531 7902	320.1504 9100	370.3139 3839	89
90	247.1566 5632	284.7981 2555	329.1542 5328	381.4975 7170	90
91	253.0997 8944	292.2060 8337	338.3831 0961	392.9887 5492	91
92	259.1617 8523	299.7807 2025	347.8426 8735	404.7959 4568	92
93	265.3450 2094	307.5257 8645	357.5387 5453	416.9278 3418	93
94	271.6519 2135	315.4451 1665	367.4772 2339	429.3933 4962	94
95	278.0849 5978	323.5426 3177	377.6641 5398	442.2016 6674	95
96	284.6466 5898	331.8223 4099	388.1057 5783	455.3622 1257	96
97	291.3395 9216	340.2883 4366	398.8084 0177	468.8846 7342	97
98	298.1663 8400	348.9448 3139	409.7786 1182	482.7790 0194	98
99	305.1297 1168	357.7960 9010	421.0230 7711	497.0554 2449	99
100	312.2323 0591	366.8465 0213	432.5486 5404	511.7244 4867	100

Amount of 1 per Annum at Compound Interest

$$s_{\overline{n}|} = [(1+i)^n - 1]/i$$

n	3%	3½%	4%	4½%	n
1	1.0000 0000	1.0000 0000	1.0000 0000	1.0000 0000	1
2	2.0300 0000	2.0350 0000	2.0400 0000	2.0450 0000	2
3	3.0909 0000	3.1062 2500	3.1216 0000	3.1370 2500	3
4	4.1836 2700	4.2149 4288	4.2464 6400	4.2781 9113	4
5	5.3091 3581	5.3624 6588	5.4163 2256	5.4707 0973	5
6	6.4684 0988	6.5501 5218	6.6329 7546	6.7168 9166	6
7	7.6624 6218	7.7794 0751	7.8982 9448	8.0191 5179	7
8	8.8923 3605	9.0516 8677	9.2142 2626	9.3800 1362	8
9	10.1591 0613	10.3684 9581	10.5827 9531	10.8021 1423	9
10	11.4638 7931	11.7313 9316	12.0061 0712	12.2882 0937	10
11	12.8077 9569	13.1419 9192	13.4863 5141	13.8411 7879	11
12	14.1920 2956	14.6019 6164	15.0258 0546	15.4640 3184	12
13	15.6177 9045	16.1130 3030	16.6268 3768	17.1599 1327	13
14	17.0863 2416	17.6769 8636	18.2919 1119	18.9321 0937	14
15	18.5989 1389	19.2956 8088	20.0235 8764	20.7840 5429	15
16	20.1568 8130	20.9710 2971	21.8245 3114	22.7193 3673	16
17	21.7615 8774	22.7050 1575	23.6975 1239	24.7417 0689	17
18	23.4144 3537	24.4996 9130	25.6454 1288	26.8550 8370	18
19	25.1168 6844	26.3571 8050	27.6712 2940	29.0635 6246	19
20	26.8703 7449	28.2796 8181	29.7780 7858	31.3714 2277	20
21	28.6764 8572	30.2694 7068	31.9692 0172	33.7831 3680	21
22	30.5367 8030	32.3289 0215	34.2479 6979	36.3033 7795	22
23	32.4528 8370	34.4604 1373	36.6178 8858	38.9370 2996	23
24	34.4264 7022	36.6665 2821	39.0826 0412	41.6891 9631	24
25	36.4592 6432	38.9498 5669	41.6459 0829	44.5652 1015	25
26	38.5530 4225	41.3131 0168	44.3117 4462	47.5706 4460	26
27	40.7096 3352	43.7590 6024	47.0842 1440	50.7113 2361	27
28	42.9309 2252	46.2906 2734	49.9675 8298	53.9933 3317	28
29	45.2188 5020	48.9107 9930	52.9662 8630	57.4230 3316	29
30	47.5754 1571	51.6226 7728	56.0849 3775	61.0070 6966	30
31	50.0026 7818	54.4294 7098	59.3283 3526	64.7523 8779	31
32	52.5027 5852	57.3345 0247	62.7014 6867	68.6662 4524	32
33	55.0778 4128	60.3412 1005	66.2095 2742	72.7562 2628	33
34	57.7301 7652	63.4531 5240	69.8579 0851	77.0302 5646	34
35	60.4620 8181	66.6740 1274	73.6522 2486	81.4966 1800	35
36	63.2759 4427	70.0076 0318	77.5983 1385	86.1639 6581	36
37	66.1742 2259	73.4578 6930	81.7022 4640	91.0413 4427	37
38	69.1594 4927	77.0288 9472	85.9703 3626	96.1382 0476	38
39	72.2342 3275	80.7249 0604	90.4091 4971	101.4644 2398	39
40	75.4012 5973	84.5502 7775	95.0255 1570	107.0303 2306	40
41	78.6632 9753	88.5095 3747	99.8265 3633	112.8466 8760	41
42	82.0231 9645	92.6073 7128	104.8195 9778	118.9247 8854	42
43	85.4838 9234	96.8486 2928	110.0123 8169	125.2764 0402	43
44	89.0484 0911	101.2383 3130	115.4128 7696	131.9138 4220	44
45	92.7198 6139	105.7816 7290	121.0293 9204	138.8499 6510	45
46	96.5014 5723	110.4840 3145	126.8705 6772	146.0982 1353	46
47	100.3965 0095	115.3509 7255	132.9453 9043	153.6726 3314	47
48	104.4083 9598	120.3882 5659	139.2632 0604	161.5879 0163	48
49	108.5406 4785	125.6018 4557	145.8337 3429	169.8593 5720	49
50	112.7968 6729	130.9979 1016	152.6670 8366	178.5030 2828	50

Amount of 1 per Annum at Compound Interest

$$s_{\overline{n}|} = [(1+i)^n - 1]/i$$

n	3%	3½%	4%	4½%	n
51	117.1807 7331	136.5828 3702	159.7737 6700	187.5356 6455	51
52	121.6961 9651	142.3632 3631	167.1647 1768	196.9747 6946	52
53	126.3470 8240	148.3459 4958	174.8513 0639	206.8386 3408	53
54	131.1374 9488	154.5380 5782	182.8453 5865	217.1463 7262	54
55	136.0716 1972	160.9468 8984	191.1591 7299	227.9179 5938	55
56	141.1537 6831	167.5800 3099	199.8055 3991	239.1742 6756	56
57	146.3883 8136	174.4453 3207	208.7977 6151	250.9371 0960	57
58	151.7800 3280	181.5509 1869	218.1496 7197	263.2292 7953	58
59	157.3334 3379	188.9052 0085	227.8756 5885	276.0745 9711	59
60	163.0534 3680	196.5168 8288	237.9906 8520	289.4979 5398	60
61	168.9450 3991	204.3949 7378	248.5103 1261	303.5253 6190	61
62	175.0133 9110	212.5487 9786	259.4507 2511	318.1840 0319	62
63	181.2637 9284	220.9880 0579	270.8287 5412	333.5022 8333	63
64	187.7017 0662	229.7225 8599	282.6619 0428	349.5098 8608	64
65	194.3327 5782	238.7628 7650	294.9683 8045	366.2378 3096	65
66	201.1627 4055	248.1195 7718	307.7671 1567	383.7185 3335	66
67	208.1976 2277	257.8037 6238	321.0778 0030	401.9858 6735	67
68	215.4435 5145	267.8268 9406	334.9209 1231	421.0752 3138	68
69	222.9068 5800	278.2008 3535	349.3177 4880	441.0236 1679	69
70	230.5940 6374	288.9378 6459	364.2904 5876	461.8696 7955	70
71	238.5118 8565	300.0506 8985	379.8620 7711	483.6538 1513	71
72	246.6672 4222	311.5524 6400	396.0565 6019	506.4182 3681	72
73	255.0672 5949	323.4568 0024	412.8988 2260	530.2070 5747	73
74	263.7192 7727	335.7777 8824	430.4147 7550	555.0663 7505	74
75	272.6308 5559	348.5300 1083	448.6313 6652	581.0443 6193	75
76	281.8097 8126	361.7285 6121	467.5766 2118	608.1913 5822	76
77	291.2640 7469	375.3890 6085	487.2796 8603	636.5599 6934	77
78	301.0019 9693	389.5276 7798	507.7708 7347	666.2051 6796	78
79	311.0320 5684	404.1611 4671	529.0817 0841	697.1844 0052	79
80	321.3630 1855	419.3067 8685	551.2449 7675	729.5576 9854	80
81	332.0039 0910	434.9825 2439	574.2947 7582	763.3877 9497	81
82	342.9640 2638	451.2069 1274	598.2665 6685	798.7402 4575	82
83	354.2529 4717	467.9991 5469	623.1972 2952	835.6835 5680	83
84	365.8805 3558	485.3791 2510	649.1251 1870	874.2893 1686	84
85	377.8569 5165	503.3673 9448	676.0901 2345	914.6323 3612	85
86	390.1926 6020	521.9852 5329	704.1337 2839	956.7907 9125	86
87	402.8984 4001	541.2547 3715	733.2990 7753	1000.8463 7685	87
88	415.9853 9321	561.1986 5295	763.6310 4063	1046.8844 6381	88
89	429.4649 5500	581.8406 0581	795.1762 8225	1094.9942 6468	89
90	443.3489 0365	603.2050 2701	827.9833 3354	1145.2690 0659	90
91	457.6493 7076	625.3172 0295	862.1026 6688	1197.8061 1189	91
92	472.3788 5189	648.2033 0506	897.5867 7356	1252.7073 8692	92
93	487.5502 1744	671.8904 2073	934.4902 4450	1310.0792 1933	93
94	503.1767 2397	696.4065 8546	972.8698 5428	1370.0327 8420	94
95	519.2720 2569	721.7808 1595	1012.7846 4845	1432.6842 5949	95
96	535.8501 8645	748.0431 4451	1054.2960 3439	1498.1550 5117	96
97	552.9256 9205	775.2246 5457	1097.4678 7577	1566.5720 2847	97
98	570.5134 6281	803.3575 1748	1142.3665 9080	1638.0677 6976	98
99	588.6288 6669	832.4750 3059	1189.0612 5443	1712.7808 1939	99
100	607.2877 3270	862.6116 5666	1237.6237 0461	1790.8559 5627	100

Amount of 1 per Annum at Compound Interest

$$s_{\overline{n|}} = [(1+i)^n - 1]/i$$

n	5%	5½%	6%	6½%	n
1	1.0000 0000	1.0000 0000	1.0000 0000	1.0000 0000	1
2	2.0500 0000	2.0550 0000	2.0600 0000	2.0650 0000	2
3	3.1525 0000	3.1680 2500	3.1836 0000	3.1992 2500	3
4	4.3101 2500	4.3422 6638	4.3746 1600	4.4071 7463	4
5	5.5256 3125	5.5810 9103	5.6370 9296	5.6936 4098	5
6	6.8019 1281	6.8880 5103	6.9753 1854	7.0637 2764	6
7	8.1420 0845	8.2668 9384	8.3938 3765	8.5228 6994	7
8	9.5491 0888	9.7215 7300	9.8974 6791	10.0768 5648	8
9	11.0265 6432	11.2562 5951	11.4913 1598	11.7318 5215	9
10	12.5778 9254	12.8753 5379	13.1807 9494	13.4944 2254	10
11	14.2067 8716	14.5834 9825	14.9716 4264	15.3715 6001	11
12	15.9171 2652	16.3855 9065	16.8699 4120	17.3707 1141	12
13	17.7129 8285	18.2867 9814	18.8821 3767	19.4998 0765	13
14	19.5986 3199	20.2925 7203	21.0150 6593	21.7672 9515	14
15	21.5785 6359	22.4086 6350	23.2759 6988	24.1821 6933	15
16	23.6574 9177	24.6411 3999	25.6725 2808	26.7540 1034	16
17	25.8403 6636	26.9964 0269	28.2128 7976	29.4930 2101	17
18	28.1323 8467	29.4812 0483	30.9056 5255	32.4100 6738	18
19	30.5390 0391	32.1026 7110	33.7599 9170	35.5167 2176	19
20	33.0659 5410	34.8683 1801	36.7855 9120	38.8253 0867	20
21	35.7192 5181	37.7860 7550	39.9927 2668	42.3489 5373	21
22	38.5052 1440	40.8643 0965	43.3922 9028	46.1016 3573	22
23	41.4304 7512	44.1118 4669	46.9958 2769	50.0982 4205	23
24	44.5019 9887	47.5379 9825	50.8155 7735	54.3546 2778	24
25	47.7270 9882	51.1525 8816	54.8645 1200	58.8876 7859	25
26	51.1134 5376	54.9659 8051	59.1563 8272	63.7153 7769	26
27	54.6691 2645	58.9891 0943	63.7057 6568	68.8568 7725	27
28	58.4025 8277	63.2335 1045	68.5281 1162	74.3325 7427	28
29	62.3227 1191	67.7113 5353	73.6397 9832	80.1641 9159	29
30	66.4388 4750	72.4354 7797	79.0581 8622	86.3748 6405	30
31	70.7607 8988	77.4194 2926	84.8016 7739	92.9892 3021	31
32	75.2988 2937	82.6774 9787	90.8897 7803	100.0335 3017	32
33	80.0637 7084	88.2247 6025	97.3431 6471	107.5357 0963	33
34	85.0669 5938	94.0771 2207	104.1837 5460	115.5255 3076	34
35	90.3203 0735	100.2513 6378	111.4347 7987	124.0346 9026	35
36	95.8363 2272	106.7651 8879	119.1208 6666	133.0969 4513	36
37	101.6281 3886	113.6372 7417	127.2681 1866	142.7482 4656	37
38	107.7095 4580	120.8873 2425	135.9042 0578	153.0268 8259	38
39	114.0950 2309	128.5361 2708	145.0584 5813	163.9736 2995	39
40	120.7997 7424	136.6056 1407	154.7619 6562	175.6319 1590	40
41	127.8397 6295	145.1189 2285	165.0476 8356	188.0479 9044	41
42	135.2317 5110	154.1004 6360	175.9505 4457	201.2711 0981	42
43	142.9933 3866	163.5759 8910	187.5075 7724	215.3537 3195	43
44	151.1430 0559	173.5726 6850	199.7580 3188	230.3517 2453	44
45	159.7001 5587	184.1191 6527	212.7435 1379	246.3245 8662	45
46	168.6851 6366	195.2457 1936	226.5081 2462	263.3356 8475	46
47	178.1194 2185	206.9842 3392	241.0986 1210	281.4525 0426	47
48	188.0253 9294	219.3683 6679	256.5645 2882	300.7469 1704	48
49	198.4266 6259	232.4336 2696	272.9584 0055	321.2954 6665	49
50	209.3479 9572	246.2174 7645	290.3359 0458	343.1796 7198	50

Amount of 1 per Annum at Compound Interest

$$s_{\overline{n}|}=[(1+i)^n-1]/i$$

n	5%	5½%	6%	6½%	*n*
51	220.8153 9550	260.7594 3765	308.7560 5866	366.4863 5066	51
52	232.8561 6528	276.1012 0672	328.2814 2239	391.3079 6345	52
53	245.4989 7354	292.2867 7309	348.9783 0773	417.7429 8108	53
54	258.7739 2222	309.3625 4561	370.9170 0620	445.8962 7485	54
55	272.7126 1833	327.3774 8562	394.1720 2657	475.8795 3271	55
56	287.3482 4924	346.3832 4733	418.8223 4816	507.8117 0234	56
57	302.7156 6171	366.4343 2593	444.9516 8905	541.8194 6299	57
58	318.8514 4479	387.5882 1386	472.6487 9040	578.0377 2808	58
59	335.7940 1703	409.9055 6562	502.0077 1782	616.6101 8041	59
60	353.5837 1788	433.4503 7173	533.1281 8089	657.6898 4214	60
61	372.2629 0378	458.2901 4217	566.1158 7174	701.4396 8187	61
62	391.8760 4897	484.4960 9999	601.0828 2405	748.0332 6120	62
63	412.4698 5141	512.1433 8549	638.1477 9349	797.6554 2317	63
64	434.0933 4398	541.3112 7170	677.4366 6110	850.5030 2568	64
65	456.7980 1118	572.0833 9164	719.0828 6076	906.7857 2235	65
66	480.6379 1174	604.5479 7818	763.2278 3241	966.7267 9430	66
67	505.6698 0733	638.7981 1698	810.0215 0236	1030.5640 3593	67
68	531.9532 9770	674.9320 1341	859.6227 9250	1098.5506 9827	68
69	559.5509 6258	713.0532 7415	912.2001 6005	1170.9564 9365	69
70	588.5285 1071	753.2712 0423	967.9321 6965	1248.0686 6574	70
71	618.9549 3625	795.7011 2046	1027.0080 9983	1330.1931 2901	71
72	650.9026 8306	840.4646 8209	1089.6285 8582	1417.6556 8240	72
73	684.4478 1721	887.6902 3960	1156.0063 0097	1510.8033 0176	73
74	719.6702 0807	937.5132 0278	1226.3666 7903	1610.0055 1637	74
75	756.6537 1848	990.0764 2893	1300.9486 7977	1715.6558 7493	75
76	795.4864 0440	1045.5306 3252	1380.0056 0055	1828.1735 0681	76
77	836.2607 2462	1104.0348 1731	1463.8059 3659	1948.0047 8475	77
78	879.0737 6085	1165.7567 3226	1552.6342 9278	2075.6250 9576	78
79	924.0274 4889	1230.8733 5254	1646.7923 5035	2211.5407 2698	79
80	971.2288 2134	1299.5713 8693	1746.5998 9137	2356.2908 7423	80
81	1020.7902 6240	1372.0478 1321	1852.3958 8485	2510.4497 8106	81
82	1072.8297 7552	1448.5104 4294	1964.5396 3794	2674.6290 1683	82
83	1127.4712 6430	1529.1785 1730	2083.4120 1622	2849.4799 0292	83
84	1184.8448 2752	1614.2833 3575	2209.4167 3719	3035.6960 9661	84
85	1245.0870 6889	1704.0689 1921	2342.9817 4142	3234.0163 4289	85
86	1308.3414 2234	1798.7927 0977	2484.5606 4591	3445.2274 0518	86
87	1374.7584 9345	1898.7263 0881	2634.6342 8466	3670.1671 8652	87
88	1444.4964 1812	2004.1562 5579	2793.7123 4174	3909.7280 5364	88
89	1517.7212 3903	2115.3848 4986	2962.3350 8225	4164.8603 7713	89
90	1594.6073 0098	2232.7310 1660	3141.0751 8718	4436.5763 0164	90
91	1675.3376 6603	2356.5312 2252	3330.5396 9841	4725.9537 6125	91
92	1760.1045 4933	2487.1404 3976	3531.3720 8032	5034.1407 5573	92
93	1849.1097 7680	2624.9331 6394	3744.2544 0514	5362.3599 0485	93
94	1942.5652 6564	2770.3044 8796	3969.9096 6944	5711.9132 9867	94
95	2040.6935 2892	2923.6712 3480	4209.1042 4961	6084.1876 6308	95
96	2143.7282 0537	3085.4731 5271	4462.6505 0459	6480.6598 6118	96
97	2251.9146 1564	3256.1741 7611	4731.4095 3486	6902.9027 5216	97
98	2365.5103 4642	3436.2637 5580	5016.2941 0696	7352.5914 3105	98
99	2484.7858 6374	3626.2582 6237	5318.2717 5337	7831.5098 7406	99
100	2610.0251 5693	3826.7024 6680	5638.3680 5857	8341.5580 1588	100

Amount of 1 per Annum at Compound Interest

$$s_{\overline{n}|}=[(1+i)^n-1]/i$$

n	7%	7½%	8%	8½%	*n*
1	1.0000 0000	1.0000 0000	1.0000 0000	1.0000 0000	1
2	2.0700 0000	2.0750 0000	2.0800 0000	2.0850 0000	2
3	3.2149 0000	3.2306 2500	3.2464 0000	3.2622 2500	3
4	4.4399 4300	4.4729 2188	4.5061 1200	4.5395 1413	4
5	5.7507 3901	5.8083 9102	5.8666 0096	5.9253 7283	5
6	7.1532 9074	7.2440 2034	7.3359 2904	7.4290 2952	6
7	8.6540 2109	8.7873 2187	8.9228 0336	9.0604 9702	7
8	10.2598 0257	10.4463 7101	10.6366 2763	10.8306 3927	8
9	11.9779 8875	12.2298 4883	12.4875 5784	12.7512 4361	9
10	13.8164 4796	14.1470 8750	14.4865 6247	14.8350 9932	10
11	15.7835 9932	16.2081 1906	16.6454 8746	17.0960 8276	11
12	17.8884 5127	18.4237 2799	18.9771 2646	19.5492 4979	12
13	20.1406 4286	20.8055 0759	21.4952 9658	22.2109 3603	13
14	22.5504 8786	23.3659 2066	24.2149 2030	25.0988 6559	14
15	25.1290 2201	26.1183 6470	27.1521 1393	28.2322 6916	15
16	27.8880 5355	29.0772 4206	30.3242 8304	31.6320 1204	16
17	30.8402 1730	32.2580 3521	33.7502 2569	35.3207 3306	17
18	33.9990 3251	35.6773 8785	37.4502 4374	39.3229 9538	18
19	37.3789 6479	39.3531 9194	41.4462 6324	43.6654 4998	19
20	40.9954 9232	43.3046 8134	45.7619 6430	48.3770 1323	20
21	44.8651 7678	47.5525 3244	50.4229 2144	53.4890 5936	21
22	49.0057 3916	52.1189 7237	55.4567 5516	59.0356 2940	22
23	53.4361 4090	57.0278 9530	60.8932 9557	65.0536 5790	23
24	58.1766 7076	62.3049 8744	66.7647 5922	71.5832 1882	24
25	63.2490 3772	67.9778 6150	73.1059 3995	78.6677 9242	25
26	68.6764 7036	74.0762 0112	79.9544 1515	86.3545 5478	26
27	74.4838 2328	80.6319 1620	87.3507 6836	94.6946 9193	27
28	80.6976 9091	87.6793 0991	95.3388 2983	103.7437 4075	28
29	87.3465 2927	95.2552 5816	103.9659 3622	113.5619 5871	29
30	94.4607 8632	103.3994 0252	113.2832 1111	124.2147 2520	30
31	102.0730 4137	112.1543 5771	123.3458 6800	135.7729 7684	31
32	110.2181 5426	121.5659 3454	134.2135 3744	148.3136 7987	32
33	118.9334 2506	131.6833 7963	145.9506 2044	161.9203 4266	33
34	128.2587 6481	142.5596 3310	158.6266 7007	176.6835 7179	34
35	138.2368 7835	154.2516 0558	172.3168 0368	192.7016 7539	35
36	148.9134 5984	166.8204 7600	187.1021 4797	210.0813 1780	36
37	160.3374 0202	180.3320 1170	203.0703 1981	228.9382 2981	37
38	172.5610 2017	194.8569 1258	220.3159 4540	249.3979 7935	38
39	185.6402 9158	210.4711 8102	238.9412 2103	271.5968 0759	39
40	199.6351 1199	227.2565 1960	259.0565 1871	295.6825 3624	40
41	214.6095 6983	245.3007 5857	280.7810 4021	321.8155 5182	41
42	230.6322 3972	264.6983 1546	304.2435 2342	350.1698 7372	42
43	247.7764 9650	285.5506 8912	329.5830 0530	380.9343 1299	43
44	266.1208 5125	307.9669 9080	356.9496 4572	414.3137 2959	44
45	285.7493 1084	332.0645 1511	386.5056 1738	450.5303 9661	45
46	306.7517 6260	357.9693 5375	418.4260 6677	489.8254 8032	46
47	329.2243 8598	385.8170 5528	452.9001 5211	532.4606 4615	47
48	353.2700 9300	415.7533 3442	490.1321 6428	578.7198 0107	48
49	378.9989 9951	447.9348 3451	530.3427 3742	628.9109 8416	49
50	406.5289 2947	482.5299 4709	573.7701 5642	683.3684 1782	50

Amount of 1 per Annum at Compound Interest

$$s_{\overline{n}|}=[(1+i)^n-1]/i$$

n	7%	7½%	8%	8½%	*n*
51	435.9859 5454	519.7196 9313	620.6717 6893	742.4547 3333	51
52	467.5049 7135	559.6986 7011	671.3255 1044	806.5633 8566	52
53	501.2303 1935	602.6760 7037	726.0315 5128	876.1212 7345	53
54	537.3164 4170	648.8767 7565	785.1140 7538	951.5915 8169	54
55	575.9285 9262	698.5425 3382	848.9232 0141	1033.4768 6613	55
56	617.2435 9410	751.9332 2386	917.8370 5752	1122.3223 9975	56
57	661.4506 4569	809.3282 1564	992.2640 2213	1218.7198 0373	57
58	708.7521 9089	871.0278 3182	1072.6451 4390	1323.3109 8705	58
59	759.3648 4425	937.3549 1920	1159.4567 5541	1436.7924 2095	59
60	813.5203 8335	1008.6565 3814	1253.2132 9584	1559.9197 7673	60
61	871.4668 1019	1085.3057 7851	1354.4703 5951	1693.5129 5775	61
62	933.4694 8690	1167.7037 1189	1463.8279 8827	1838.4615 5916	62
63	999.8123 5098	1256.2814 9029	1581.9342 2733	1995.7307 9169	63
64	1070.7992 1555	1351.5026 0206	1709.4889 6552	2166.3679 0898	64
65	1146.7551 6064	1453.8652 9721	1847.2480 8276	2351.5091 8125	65
66	1228.0280 2188	1563.9051 9450	1996.0279 2938	2552.3874 6165	66
67	1314.9899 8341	1682.1980 8409	2156.7101 6373	2770.3403 9589	67
68	1408.0392 8225	1809.3629 4040	2330.2469 7683	3006.8193 2954	68
69	1507.6020 3201	1946.0651 6093	2517.6667 3497	3263.3989 7255	69
70	1614.1341 7425	2093.0200 4800	2720.0800 7377	3541.7878 8522	70
71	1728.1235 6645	2250.9965 5160	2938.6864 7967	3843.8398 5546	71
72	1850.0922 1610	2420.8212 9296	3174.7813 9805	4171.5662 4318	72
73	1980.5986 7123	2603.3828 8994	3429.7639 0989	4527.1493 7385	73
74	2120.2405 7821	2799.6366 0668	3705.1450 2268	4912.9570 7063	74
75	2269.6574 1869	3010.6093 5218	4002.5566 2449	5331.5584 2163	75
76	2429.5334 3800	3237.4050 5360	4323.7611 5445	5785.7408 8747	76
77	2600.6007 7866	3481.2104 3262	4670.6620 4681	6278.5288 6290	77
78	2783.6428 3316	3743.3012 1506	5045.3150 1056	6813.2038 1625	78
79	2979.4978 3148	4025.0488 0619	5449.9402 1140	7393.3261 4063	79
80	3189.0626 7969	4327.9274 6666	5886.9354 2831	8022.7588 6259	80
81	3413.2970 6727	4653.5220 2666	6358.8902 6258	8705.6933 6591	81
82	3653.2278 6198	5003.5361 7866	6868.6014 8358	9446.6773 0201	82
83	3909.9538 1231	5379.8013 9206	7419.0896 0227	10250.6448 7268	83
84	4184.6505 7918	5784.2864 9646	8013.6167 7045	11122.9496 8686	84
85	4478.5761 1972	6219.1079 8369	8655.7061 1209	12069.4004 1024	85
86	4793.0764 4810	6686.5410 8247	9349.1626 0105	13096.2994 4511	86
87	5129.5917 9946	7189.0316 6366	10098.0956 0914	14210.4848 9794	87
88	5489.6632 2543	7729.2090 3843	10906.9432 5787	15419.3761 1427	88
89	5874.9396 5121	8309.8997 1631	11780.4987 1850	16731.0230 8398	89
90	6287.1854 2679	8934.1421 9504	12723.9386 1598	18154.1600 4612	90
91	6728.2884 0667	9605.2028 5966	13742.8537 0526	19698.2636 5004	91
92	7200.2685 9513	10326.5930 7414	14843.2820 0168	21373.6160 6029	92
93	7705.2873 9679	11102.0875 5470	16031.7445 6181	23191.3734 2542	93
94	8245.6575 1457	11935.7441 2130	17315.2841 2676	25163.6401 6658	94
95	8823.8535 4059	12831.9249 3040	18701.5068 5690	27303.5495 8074	95
96	9442.5232 8843	13795.3193 0018	20198.6274 0545	29625.3512 9510	96
97	10104.4999 1862	14830.9682 4769	21815.5175 9788	32144.5061 5518	97
98	10812.8149 1292	15944.2908 6627	23561.7590 0572	34877.7891 7837	98
99	11570.7119 5683	17141.1126 8124	25447.6997 2617	37843.4012 5853	99
100	12381.6617 9381	18427.6961 3233	27484.5157 0427	41061.0903 6551	100

Present Value of 1 per Annum at Compound Interest

$$a_{\overline{n|}} = (1 - v^n)/i$$

n	$\frac{1}{4}\%$	$\frac{7}{24}\%$	$\frac{1}{3}\%$	$\frac{5}{12}\%$	n
1	0.9975 0623	0.9970 9182	0.9966 7774	0.9958 5062	1
2	1.9925 2492	1.9912 8390	1.9900 4426	1.9875 6908	2
3	2.9850 6227	2.9825 8470	2.9801 1056	2.9751 7253	3
4	3.9751 2446	3.9710 0260	3.9668 8760	3.9586 7804	4
5	4.9627 1766	4.9565 4601	4.9503 8631	4.9381 0261	5
6	5.9478 4804	5.9392 2327	5.9306 1759	5.9134 6318	6
7	6.9305 2174	6.9190 4273	6.9075 9228	6.8847 7661	7
8	7.9107 4487	7.8960 1269	7.8813 2121	7.8520 5969	8
9	8.8885 2357	8.8701 4144	8.8518 1516	8.8153 2915	9
10	9.8638 6391	9.8414 3725	9.8190 8487	9.7746 0164	10
11	10.8367 7198	10.8099 0834	10.7831 4107	10.7298 9374	11
12	11.8072 5384	11.7755 6295	11.7439 9442	11.6812 2198	12
13	12.7753 1555	12.7384 0915	12.7016 5557	12.6286 0280	13
14	13.7409 6314	13.6984 5542	13.6561 3512	13.5720 5257	14
15	14.7042 0264	14.6557 0959	14.6074 4364	14.5115 8762	15
16	15.6650 4004	15.6101 7990	15.5555 9167	15.4472 2418	16
17	16.6234 8133	16.5618 7442	16.5005 8970	16.3789 7843	17
18	17.5795 3250	17.5108 0125	17.4424 4821	17.3068 6648	18
19	18.5331 9950	18.4569 6842	18.3811 7762	18.2309 0438	19
20	19.4844 8828	19.4003 8396	19.3167 8832	19.1511 0809	20
21	20.4334 0477	20.3410 5587	20.2492 9069	20.0674 9352	21
22	21.3799 5488	21.2789 9213	21.1786 9504	20.9800 7653	22
23	22.3241 4452	22.2142 0071	22.1050 1167	21.8888 7289	23
24	23.2659 7957	23.1466 8952	23.0282 5083	22.7938 9831	24
25	24.2054 6591	24.0764 6648	23.9484 2275	23.6951 6843	25
26	25.1426 0939	25.0035 3949	24.8655 3763	24.5926 9884	26
27	26.0774 1585	25.9279 1639	25.7796 0561	25.4865 0506	27
28	27.0098 9112	26.8496 0503	26.6906 3682	26.3766 0254	28
29	27.9400 4102	27.7686 1324	27.5986 4135	27.2630 0668	29
30	28.8678 7134	28.6849 4879	28.5036 2925	28.1457 3278	30
31	29.7933 8787	29.5986 1947	29.4056 1055	29.0247 9612	31
32	30.7165 9638	30.5096 3303	30.3045 9523	29.9002 1189	32
33	31.6375 0262	31.4179 9720	31.2005 9325	30.7719 9524	33
34	32.5561 1234	32.3237 1967	32.0936 1454	31.6401 6122	34
35	33.4724 3126	33.2268 0814	32.9836 6898	32.5047 2486	35
36	34.3864 6510	34.1272 7025	33.8707 6642	33.3657 0109	36
37	35.2982 1955	35.0251 1366	34.7549 1670	34.2231 0481	37
38	36.2077 0030	35.9203 4597	35.6361 2960	35.0769 5084	38
39	37.1149 1302	36.8129 7478	36.5144 1488	35.9272 5394	39
40	38.0198 6336	37.7030 0767	37.3897 8228	36.7740 2881	40
41	38.9225 5697	38.5904 5217	38.2622 4147	37.6172 9009	41
42	39.8229 9947	39.4753 1582	39.1318 0213	38.4570 5236	42
43	40.7211 9648	40.3576 0612	39.9984 7388	39.2933 3013	43
44	41.6171 5359	41.2373 3056	40.8622 6633	40.1261 3788	44
45	42.5108 7640	42.1144 9659	41.7231 8903	40.9554 8999	45
46	43.4023 7047	42.9891 1167	42.5812 5153	41.7814 0081	46
47	44.2916 4137	43.8611 8320	43.4364 6332	42.6038 8461	47
48	45.1786 9463	44.7307 1859	44.2888 3387	43.4229 5562	48
49	46.0635 3580	45.5977 2521	45.1383 7263	44.2386 2799	49
50	46.9461 7037	46.4622 1042	45.9850 8900	45.0509 1582	50

Present Value of 1 per Annum at Compound Interest

$$a_{\overline{n}|} = (1 - v^n)/i$$

n	¼%	7/24%	⅓%	5/12%	n
51	47.8266 0386	47.3241 8154	46.8289 9236	45.8598 3317	51
52	48.7048 4176	48.1836 4589	47.6700 9205	46.6653 9401	52
53	49.5808 8953	49.0406 1076	48.5083 9739	47.4676 1228	53
54	50.4547 5265	49.8950 8341	49.3439 1767	48.2665 0184	54
55	51.3264 3656	50.7470 7110	50.1766 6213	49.0620 7651	55
56	52.1959 4669	51.5965 8106	51.0066 3999	49.8543 5003	56
57	53.0632 8847	52.4436 2048	51.8338 6046	50.6433 3612	57
58	53.9284 6730	53.2881 9656	52.6583 3268	51.4290 4840	58
59	54.7914 8858	54.1303 1645	53.4800 6580	52.2115 0046	59
60	55.6523 5769	54.9699 8730	54.2990 6890	52.9907 0584	60
61	56.5110 7999	55.8072 1623	55.1153 5106	53.7666 7800	61
62	57.3676 6083	56.6420 1035	55.9289 2133	54.5394 3035	62
63	58.2221 0557	57.4743 7673	56.7397 8870	55.3089 7627	63
64	59.0744 1952	58.3043 2244	57.5479 6216	56.0753 2905	64
65	59.9246 0800	59.1318 5451	58.3534 5065	56.8385 0194	65
66	60.7726 7631	59.9569 7996	59.1562 6311	57.5985 0814	66
67	61.6186 2974	60.7797 0580	59.9564 0842	58.3553 6078	67
68	62.4624 7355	61.6000 3900	60.7538 9543	59.1090 7296	68
69	63.3042 1302	62.4179 8652	61.5487 3299	59.8596 5770	69
70	64.1438 5339	63.2335 5529	62.3409 2989	60.6071 2798	70
71	64.9813 9989	64.0467 5224	63.1304 9490	61.3514 9672	71
72	65.8168 5774	64.8575 8427	63.9174 3678	62.0927 7680	72
73	66.6502 3216	65.6660 5824	64.7017 6423	62.8309 8103	73
74	67.4815 2834	66.4721 8103	65.4834 8595	63.5661 2216	74
75	68.3107 5146	67.2759 5945	66.2626 1058	64.2982 1292	75
76	69.1379 0670	68.0774 0035	67.0391 4676	65.0272 6596	76
77	69.9629 9920	68.8765 1050	67.8131 0308	65.7532 9388	77
78	70.7860 3411	69.6732 9670	68.5844 8812	66.4763 0924	78
79	71.6070 1657	70.4677 6569	69.3533 1042	67.1963 2453	79
80	72.4259 5169	71.2599 2422	70.1195 7849	67.9133 5221	80
81	73.2428 4458	72.0497 7901	70.8833 0082	68.6274 0467	81
82	74.0577 0033	72.8373 3675	71.6444 8587	69.3384 9426	82
83	74.8705 2402	73.6226 0413	72.4031 4206	70.0466 3326	83
84	75.6813 2072	74.4055 8781	73.1592 7780	70.7518 3393	84
85	76.4900 9548	75.1862 9442	73.9129 0146	71.4541 0846	85
86	77.2968 5335	75.9647 3060	74.6640 2139	72.1534 6898	86
87	78.1015 9935	76.7409 0294	75.4126 4591	72.8499 2759	87
88	78.9043 3850	77.5148 1803	76.1587 8329	73.5434 9633	88
89	79.7050 7581	78.2864 8243	76.9024 4182	74.2341 8720	89
90	80.5038 1627	79.0559 0268	77.6436 2972	74.9220 1212	90
91	81.3005 6486	79.8230 8532	78.3823 5520	75.6069 8300	91
92	82.0953 2654	80.5880 3685	79.1186 2645	76.2891 1168	92
93	82.8881 0628	81.3507 6377	79.8524 5161	76.9684 0995	93
94	83.6789 0900	82.1112 7253	80.5838 3882	77.6448 8955	94
95	84.4677 3966	82.8695 6959	81.3127 9616	78.3185 6218	95
96	85.2546 0315	83.6256 6138	82.0393 3172	78.9894 3950	96
97	86.0395 0439	84.3795 5432	82.7634 5354	79.6575 3308	97
98	86.8224 4827	85.1312 5480	83.4851 6964	80.3228 5450	98
99	87.6034 3967	85.8807 6919	84.2044 8802	80.9854 1524	99
100	88.3824 8346	86.6281 0386	84.9214 1663	81.6452 2677	100

Present Value of 1 per Annum at Compound Interest

$$a_{\overline{n}|}=(1-v^n)/i$$

n	$\frac{1}{4}\%$	$\frac{7}{24}\%$	$\frac{1}{3}\%$	$\frac{5}{12}\%$	n
101	89.1595 8450	87.3732 6514	85.6359 6344	82.3023 0049	101
102	89.9347 4763	88.1162 5935	86.3481 3635	82.9566 4777	102
103	90.7079 7768	88.8570 9280	87.0579 4323	83.6082 7991	103
104	91.4792 7948	89.5957 7177	87.7653 9195	84.2572 0818	104
105	92.2486 5784	90.3323 0252	88.4704 9034	84.9034 4381	105
106	93.0161 1755	91.0666 9131	89.1732 4621	85.5469 9795	106
107	93.7816 6339	91.7989 4436	89.8736 6735	86.1878 8175	107
108	94.5453 0014	92.5290 6788	90.5717 6150	86.8261 0628	108
109	95.3070 3256	93.2570 6806	91.2675 3641	87.4616 8258	109
110	96.0668 6539	93.9829 5109	91.9609 9977	88.0946 2163	110
111	96.8248 0338	94.7067 2312	92.6521 5927	88.7249 3437	111
112	97.5808 5126	95.4283 9028	93.3410 2255	89.3526 3171	112
113	98.3350 1372	96.1479 5870	94.0275 9726	89.9777 2450	113
114	99.0872 9548	96.8654 3448	94.7118 9098	90.6002 2354	114
115	99.8377 0123	97.5808 2372	95.3939 1131	91.2201 3959	115
116	100.5862 3564	98.2941 3246	96.0736 6578	91.8374 8338	116
117	101.3329 0338	99.0053 6678	96.7511 6194	92.4522 6558	117
118	102.0777 0911	99.7145 3269	97.4264 0727	93.0644 9681	118
119	102.8206 5747	100.4216 3621	98.0994 0927	93.6741 8767	119
120	103.5617 5308	101.1266 8335	98.7701 7538	94.2813 4869	120
121	104.3010 0058	101.8296 8009	99.4387 1304	94.8859 9036	121
122	105.0384 0457	102.5306 3237	100.1050 2964	95.4881 2315	122
123	105.7739 6965	103.2295 4616	100.7691 3256	96.0877 5747	123
124	106.5077 0040	103.9264 2738	101.4310 2916	96.6849 0367	124
125	107.2396 0139	104.6212 8194	102.0907 2677	97.2795 7209	125
126	107.9696 7720	105.3141 1573	102.7482 3269	97.8717 7301	126
127	108.6979 3237	106.0049 3464	103.4035 5420	98.4615 1666	127
128	109.4243 7144	106.6937 4451	104.0566 9857	99.0488 1324	128
129	110.1489 9894	107.3805 5120	104.7076 7303	99.6336 7290	129
130	110.8718 1939	108.0653 6053	105.3564 8478	100.2161 0576	130
131	111.5928 3730	108.7481 7831	106.0031 4101	100.7961 2189	131
132	112.3120 5716	109.4290 1032	106.6476 4888	101.3737 3131	132
133	113.0294 8345	110.1078 6235	107.2900 1552	101.9489 4401	133
134	113.7451 2065	110.7847 4016	107.9302 4806	102.5217 6994	134
135	114.4589 7321	111.4596 4947	108.5683 5358	103.0922 1899	135
136	115.1710 4560	112.1325 9603	109.2043 3915	103.6603 0104	136
137	115.8813 4224	112.8035 8553	109.8382 1181	104.2260 2590	137
138	116.5898 6758	113.4726 2368	110.4699 7859	104.7894 0335	138
139	117.2966 2601	114.1397 1613	111.0996 4646	105.3504 4314	139
140	118.0016 2196	114.8048 6856	111.7272 2242	105.9091 5496	140
141	118.7048 5981	115.4680 8660	112.3527 1341	106.4655 4847	141
142	119.4063 4395	116.1293 7588	112.9761 2636	107.0196 3330	142
143	120.1060 7875	116.7887 4201	113.5974 6817	107.5714 1902	143
144	120.8040 6858	117.4461 9058	114.2167 4572	108.1209 1517	144
145	121.5003 1778	118.1017 2717	114.8339 6586	108.6681 3126	145
146	122.1948 3071	118.7553 5734	115.4491 3545	109.2130 7674	146
147	122.8876 1168	119.4070 8663	116.0622 6128	109.7557 6103	147
148	123.5786 6502	120.0569 2057	116.6733 5015	110.2961 9353	148
149	124.2679 9503	120.7048 6467	117.2824 0882	110.8343 8356	149
150	124.9556 0601	121.3509 2444	117.8894 4404	111.3703 4044	150

Present Value of 1 per Annum at Compound Interest

$$a_{\overline{n|}} = (1 - v^n)/i$$

n	$\frac{1}{4}\%$	$\frac{7}{24}\%$	$\frac{1}{3}\%$	$\frac{5}{12}\%$	n
151	125.6415 0226	121.9951 0534	118.4944 6254	111.9040 7343	151
152	126.3256 8804	122.6374 1284	119.0974 7100	112.4355 9176	152
153	127.0081 6762	123.2778 5240	119.6984 7612	112.9649 0463	153
154	127.6889 4525	123.9164 2944	120.2974 8454	113.4920 2117	154
155	128.3680 2519	124.5531 4937	120.8945 0290	114.0169 5051	155
156	129.0454 1166	125.1880 1761	121.4895 3781	114.5397 0171	156
157	129.7211 0889	125.8210 3954	122.0825 9587	115.0602 8383	157
158	130.3951 2109	126.4522 2052	122.6736 8363	115.5787 0585	158
159	131.0674 5246	127.0815 6591	123.2628 0764	116.0949 7674	159
160	131.7381 0719	127.7090 8105	123.8499 7443	116.6091 0543	160
161	132.4070 8946	128.3347 7125	124.4351 9050	117.1211 0081	161
162	133.0744 0346	128.9586 4184	125.0184 6233	117.6309 7172	162
163	133.7400 5332	129.5806 9809	125.5997 9638	118.1387 2699	163
164	134.4040 4321	130.2009 4529	126.1791 9909	118.6443 7539	164
165	135.0663 7727	130.8193 8870	126.7566 7687	119.1479 2566	165
166	135.7270 5962	131.4360 3355	127.3322 3612	119.6493 8641	166
167	136.3860 9439	132.0508 8509	127.9058 8322	120.1487 6662	167
168	137.0434 8567	132.6639 4853	128.4776 2451	120.6460 7460	168
169	137.6992 3758	133.2752 2907	129.0474 6633	121.1413 1907	169
170	138.3533 5419	133.8847 3189	129.6154 1499	121.6345 0858	170
171	139.0058 3959	134.4924 6216	130.1814 7677	122.1256 5166	171
172	139.6566 9785	135.0984 2504	130.7456 5795	122.6147 5680	172
173	140.3059 3302	135.7026 2567	131.3079 6478	123.1018 3246	173
174	140.9535 4914	136.3050 6917	131.8684 0347	123.5868 8705	174
175	141.5995 5027	136.9057 6066	132.4269 8025	124.0699 2898	175
176	142.2439 4042	137.5047 0522	132.9837 0128	124.5509 6658	176
177	142.8867 2361	138.1019 0794	133.5385 7275	125.0300 0817	177
178	143.5279 0385	138.6973 7389	134.0916 0079	125.5070 6204	178
179	144.1674 8514	139.2911 0811	134.6427 9152	125.9821 3643	179
180	144.8054 7146	139.8831 1564	135.1921 5106	126.4552 3956	180
181	145.4418 6679	140.4734 0151	135.7396 8549	126.9263 7961	181
182	146.0766 7510	141.0619 7071	136.2854 0086	127.3955 6471	182
183	146.7099 0035	141.6488 2825	136.8293 0322	127.8628 0299	183
184	147.3415 4649	142.2339 7909	137.3713 9860	128.3281 0253	184
185	147.9716 1744	142.8174 2821	137.9116 9300	128.7914 7136	185
186	148.6001 1715	143.3991 8055	138.4501 9241	129.2529 1749	186
187	149.2270 4952	143.9792 4105	138.9869 0277	129.7124 4891	187
188	149.8524 1848	144.5576 1463	139.5218 3005	130.1700 7357	188
189	150.4762 2791	145.1343 0618	140.0549 8016	130.6257 9936	189
190	151.0984 8170	145.7093 2062	140.5863 5901	131.0796 3418	190
191	151.7191 8375	146.2826 6280	141.1159 7248	131.5315 8586	191
192	152.3383 3790	146.8543 3760	141.6438 2643	131.9816 6223	192
193	152.9559 4803	147.4243 4986	142.1699 2672	132.4298 7106	193
194	153.5720 1799	147.9927 0442	142.6942 7917	132.8762 2010	194
195	154.1865 5161	148.5594 0611	143.2168 8958	133.3207 1707	195
196	154.7995 5272	149.1244 5971	143.7377 6375	133.7633 6965	196
197	155.4110 2516	149.6878 7004	144.2569 0743	134.2041 8550	197
198	156.0209 7273	150.2496 4187	144.7743 2639	134.6431 7224	198
199	156.6293 9923	150.8097 7996	145.2900 2635	135.0803 3746	199
200	157.2363 0846	151.3682 8907	145.8040 1302	135.5156 8872	200

Present Value of 1 per Annum at Compound Interest

$$a_{\overline{n}|} = (1 - v^n)/i$$

n	$\frac{1}{2}\%$	$\frac{7}{12}\%$	$\frac{5}{8}\%$	$\frac{2}{3}\%$	n
1	0.9950 2488	0.9942 0050	0.9937 8882	0.9933 7748	1
2	1.9850 9938	1.9826 3513	1.9814 0504	1.9801 7631	2
3	2.9702 4814	2.9653 3733	2.9628 8699	2.9604 4004	3
4	3.9504 9566	3.9423 4034	3.9382 7279	3.9342 1196	4
5	4.9258 6633	4.9136 7723	4.9076 0029	4.9015 3506	5
6	5.8963 8441	5.8793 8084	5.8709 0712	5.8624 5205	6
7	6.8620 7404	6.8394 8385	6.8282 3068	6.8170 0535	7
8	7.8229 5924	7.7940 1875	7.7796 0813	7.7652 3710	8
9	8.7790 6392	8.7430 1781	8.7250 7640	8.7071 8917	9
10	9.7304 1186	9.6865 1315	9.6646 7220	9.6429 0315	10
11	10.6770 2673	10.6245 3669	10.5984 3200	10.5724 2035	11
12	11.6189 3207	11.5571 2016	11.5263 9205	11.4957 8180	12
13	12.5561 5131	12.4842 9511	12.4485 8837	12.4130 2828	13
14	13.4887 0777	13.4060 9291	13.3650 5676	13.3242 0028	14
15	14.4166 2465	14.3225 4473	14.2758 3281	14.2293 3802	15
16	15.3399 2502	15.2336 8160	15.1809 5186	15.1284 8148	16
17	16.2586 3186	16.1395 3432	16.0804 4905	16.0216 7035	17
18	17.1727 6802	17.0401 3354	16.9743 5931	16.9089 4405	18
19	18.0823 5624	17.9355 0974	17.8627 1733	17.7903 4177	19
20	18.9874 1915	18.8256 9320	18.7455 5759	18.6659 0242	20
21	19.8879 7925	19.7107 1404	19.6229 1438	19.5356 6466	21
22	20.7840 5896	20.5906 0220	20.4948 2174	20.3996 6688	22
23	21.6756 8055	21.4653 8745	21.3613 1353	21.2579 4723	23
24	22.5628 6622	22.3350 9938	22.2224 2338	22.1105 4361	24
25	23.4456 3803	23.1997 6741	23.0781 8473	22.9574 9365	25
26	24.3240 1794	24.0594 2079	23.9286 3079	23.7988 3475	26
27	25.1980 2780	24.9140 8862	24.7737 9457	24.6346 0406	27
28	26.0676 8936	25.7637 9979	25.6137 0889	25.4648 3847	28
29	26.9330 2423	26.6085 8307	26.4484 0635	26.2895 7464	29
30	27.7940 5397	27.4484 6702	27.2779 1935	27.1088 4898	30
31	28.6507 9997	28.2834 8006	28.1022 8010	27.9226 9766	31
32	29.5032 8355	29.1136 5044	28.9215 2060	28.7311 5662	32
33	30.3515 2592	29.9390 0625	29.7356 7265	29.5342 6154	33
34	31.1955 4818	30.7595 7540	30.5447 6785	30.3320 4789	34
35	32.0353 7132	31.5753 8566	31.3488 3761	31.1245 5088	35
36	32.8710 1624	32.3864 6463	32.1479 1315	31.9118 0551	36
37	33.7025 0372	33.1928 3974	32.9420 2550	32.6938 4653	37
38	34.5298 5445	33.9945 3828	33.7312 0546	33.4707 0848	38
39	35.3530 8900	34.7915 8736	34.5154 8369	34.2424 2564	39
40	36.1722 2786	35.5840 1396	35.2948 9062	35.0090 3209	40
41	36.9872 9141	36.3718 4487	36.0694 5652	35.7705 6168	41
42	37.7982 9991	37.1551 0676	36.8392 1145	36.5270 4803	42
43	38.6052 7354	37.9338 2612	37.6041 8529	37.2785 2453	43
44	39.4082 3238	38.7080 2929	38.3644 0774	38.0250 2437	44
45	40.2071 9640	39.4777 4248	39.1199 0831	38.7665 8050	45
46	41.0021 8547	40.2429 9170	39.8707 1634	39.5032 2566	46
47	41.7932 1937	41.0038 0287	40.6168 6096	40.2349 9238	47
48	42.5803 1778	41.7602 0170	41.3583 7114	40.9619 1296	48
49	43.3635 0028	42.5122 1380	42.0952 7566	41.6840 1949	49
50	44.1427 8635	43.2598 6460	42.8276 0314	42.4013 4387	50

Present Value of 1 per Annum at Compound Interest

$$a_{\overline{n}|} = (1 - v^n)/i$$

n	$\frac{1}{2}\%$	$\frac{7}{12}\%$	$\frac{5}{8}\%$	$\frac{2}{3}\%$	n
51	44.9181 9537	44.0031 7940	43.5553 8201	43.1139 1775	51
52	45.6897 4664	44.7421 8335	44.2786 4050	43.8217 7260	52
53	46.4574 5934	45.4769 0144	44.9974 0671	44.5249 3967	53
54	47.2213 5258	46.2073 5853	45.7117 0853	45.2234 5000	54
55	47.9814 4535	46.9335 7933	46.4215 7370	45.9173 3444	55
56	48.7377 5657	47.6555 8841	47.1270 2976	46.6066 2362	56
57	49.4903 0505	48.3734 1020	47.8281 0410	47.2913 4796	57
58	50.2391 0950	49.0870 6898	48.5248 2396	47.9715 3771	58
59	50.9841 8855	49.7965 8889	49.2172 1636	48.6472 2289	59
60	51.7255 6075	50.5019 9394	49.9053 0818	49.3184 3334	60
61	52.4632 4453	51.2033 0800	50.5891 2614	49.9851 9868	61
62	53.1972 5824	51.9005 5478	51.2686 9679	50.6475 4835	62
63	53.9276 2014	52.5937 5787	51.9440 4650	51.3055 1161	63
64	54.6543 4839	53.2829 4073	52.6152 0149	51.9591 1749	64
65	55.3774 6109	53.9681 2668	53.2821 8781	52.6083 9486	65
66	56.0969 7621	54.6493 3888	53.9450 3137	53.2533 7238	66
67	56.8129 1165	55.3266 0040	54.6037 5788	53.8940 7852	67
68	57.5252 8522	55.9999 3413	55.2583 9293	54.5305 4158	68
69	58.2341 1465	56.6693 6287	55.9089 6191	55.1627 8965	69
70	58.9394 1756	57.3349 0925	56.5554 9010	55.7908 5064	70
71	59.6412 1151	57.9965 9579	57.1980 0258	56.4147 5229	71
72	60.3395 1394	58.6544 4488	57.8365 2431	57.0345 2215	72
73	61.0343 4222	59.3084 7877	58.4710 8006	57.6501 8756	73
74	61.7257 1366	59.9587 1959	59.1016 9447	58.2617 7572	74
75	62.4136 4543	60.6051 8934	59.7283 9201	58.8693 1363	75
76	63.0981 5466	61.2479 0988	60.3511 9703	59.4728 2811	76
77	63.7792 5836	61.8869 0297	60.9701 3370	60.0723 4581	77
78	64.4569 7350	62.5221 9021	61.5852 2604	60.6678 9319	78
79	65.1313 1691	63.1537 9310	62.1964 9792	61.2594 9654	79
80	65.8023 0538	63.7817 3301	62.8039 7309	61.8471 8200	80
81	66.4699 5561	64.4060 3118	63.4076 7512	62.4309 7549	81
82	67.1342 8419	65.0267 0874	64.0076 2745	63.0109 0281	82
83	67.7953 0765	65.6437 8667	64.6038 5337	63.5869 8954	83
84	68.4530 4244	66.2572 8585	65.1963 7602	64.1592 6114	84
85	69.1075 0491	66.8672 2705	65.7852 1840	64.7277 4285	85
86	69.7587 1135	67.4736 3089	66.3704 0338	65.2924 5979	86
87	70.4066 7796	68.0765 1789	66.9519 5367	65.8534 3687	87
88	71.0514 2086	68.6759 0845	67.5298 9185	66.4106 9888	88
89	71.6929 5608	69.2718 2283	68.1042 4034	66.9642 7041	89
90	72.3312 9958	69.8642 8121	68.6750 2146	67.5141 7590	90
91	72.9664 6725	70.4533 0363	69.2422 5735	68.0604 3964	91
92	73.5984 7487	71.0389 1001	69.8059 7004	68.6030 8574	92
93	74.2273 3818	71.6211 2017	70.3661 8141	69.1421 3815	93
94	74.8530 7282	72.1999 5379	70.9229 1320	69.6776 2068	94
95	75.4756 9434	72.7754 3047	71.4761 8703	70.2095 5696	95
96	76.0952 1825	73.3475 6967	72.0260 2438	70.7379 7049	96
97	76.7116 5995	73.9163 9075	72.5724 4658	71.2628 8460	97
98	77.3250 3478	74.4819 1294	73.1154 7487	71.7843 2245	98
99	77.9353 5799	75.0441 5539	73.6551 3030	72.3023 0707	99
100	78.5426 4477	75.6031 3712	74.1914 3384	72.8168 6132	100

Present Value of 1 per Annum at Compound Interest

$$a_{\overline{n}|} = (1 - v^n)/i$$

n	$\frac{1}{2}\%$	$\frac{7}{12}\%$	$\frac{5}{8}\%$	$\frac{2}{3}\%$	n
101	79.1469 1021	76.1588 7702	74.7244 0630	73.3280 0792	101
102	79.7481 6937	76.7113 9392	75.2540 6838	73.8357 6944	102
103	80.3464 3718	77.2607 0648	75.7804 4062	74.3401 6830	103
104	80.9417 2854	77.8068 3331	76.3035 4348	74.8412 2677	104
105	81.5340 5825	78.3497 9288	76.8233 9724	75.3389 6697	105
106	82.1234 4104	78.8896 0355	77.3400 2210	75.8334 1088	106
107	82.7098 9158	79.4262 8359	77.8534 3812	76.3245 8032	107
108	83.2934 2446	79.9598 5115	78.3636 6521	76.8124 9699	108
109	83.8740 5419	80.4903 2428	78.8707 2319	77.2971 8242	109
110	84.4517 9522	81.0177 2093	79.3746 3174	77.7786 5801	110
111	85.0266 6191	81.5420 5895	79.8754 1043	78.2569 4503	111
112	85.5986 6856	82.0633 5606	80.3730 7868	78.7320 6458	112
113	86.1678 2942	82.5816 2991	80.8676 5583	79.2040 3764	113
114	86.7341 5862	83.0968 9803	81.3591 6108	79.6728 8505	114
115	87.2976 7027	83.6091 7785	81.8476 1349	80.1386 2751	115
116	87.8583 7838	84.1184 8671	82.3330 3204	80.6012 8559	116
117	88.4162 9690	84.6248 4182	82.8154 3557	81.0608 7970	117
118	88.9714 3970	85.1282 6033	83.2948 4280	81.5174 3015	118
119	89.5238 2059	85.6287 5926	83.7712 7235	81.9709 5708	119
120	90.0734 5333	86.1263 5554	84.2447 4271	82.4214 8052	120
121	90.6203 5157	86.6210 6602	84.7152 7226	82.8690 2036	121
122	91.1645 2892	87.1129 0742	85.1828 7926	83.3135 9636	122
123	91.7059 9893	87.6018 9638	85.6475 8188	83.7552 2815	123
124	92.2447 7505	88.0880 4946	86.1093 9814	84.1939 3523	124
125	92.7808 7070	88.5713 8308	86.5683 4597	84.6297 3696	125
126	93.3142 9920	89.0519 1361	87.0244 4320	85.0626 5259	126
127	93.8450 7384	89.5296 5731	87.4777 0753	85.4927 0122	127
128	94.3732 0780	90.0046 3032	87.9281 5655	85.9199 0185	128
129	94.8987 1422	90.4768 4873	88.3758 0776	86.3442 7334	129
130	95.4216 0619	90.9463 2851	88.8206 7852	86.7658 3442	130
131	95.9418 9671	91.4130 8554	89.2627 8610	87.1846 0371	131
132	96.4595 9872	91.8771 3561	89.7021 4768	87.6005 9969	132
133	96.9747 2509	92.3384 9442	90.1387 8030	88.0138 4072	133
134	97.4872 8865	92.7971 7758	90.5727 0092	88.4243 4507	134
135	97.9973 0214	93.2532 0060	91.0039 2638	88.8321 3084	135
136	98.5047 7825	93.7065 7892	91.4324 7342	89.2372 1604	136
137	99.0097 2960	94.1573 2787	91.8583 5868	89.6396 1856	137
138	99.5121 6875	94.6054 6270	92.2815 9869	90.0393 5616	138
139	100.0121 0821	95.0509 9857	92.7022 0988	90.4364 4649	139
140	100.5095 6041	95.4939 5056	93.1202 0857	90.8309 0709	140
141	101.0045 3772	95.9343 3364	93.5356 1100	91.2227 5536	141
142	101.4970 5246	96.3721 6272	93.9484 3330	91.6120 0861	142
143	101.9871 1688	96.8074 5261	94.3586 9148	91.9986 8402	143
144	102.4747 4316	97.2402 1804	94.7664 0147	92.3827 9867	144
145	102.9599 4344	97.6704 7364	95.1715 7910	92.7643 6952	145
146	103.4427 2979	98.0982 3397	95.5742 4010	93.1434 1340	146
147	103.9231 1422	98.5235 1350	95.9744 0010	93.5199 4706	147
148	104.4011 0868	98.9463 2663	96.3720 7463	93.8939 8712	148
149	104.8767 2505	99.3666 8765	96.7672 7913	94.2655 5010	149
150	105.3499 7518	99.7846 1078	97.1600 2895	94.6346 5239	150

Present Value of 1 per Annum at Compound Interest

$$a_{\overline{n|}} = (1 - v^n)/i$$

n	$\frac{1}{2}\%$	$\frac{7}{12}\%$	$\frac{5}{8}\%$	$\frac{2}{3}\%$	n
151	105.8208 7082	100.2001 1017	97.5503 3933	95.0013 1029	151
152	106.2894 2371	100.6131 9987	97.9382 2542	95.3655 4000	152
153	106.7556 4548	101.0238 9385	98.3237 0228	95.7273 5759	153
154	107.2195 4774	101.4322 0601	98.7067 8488	96.0867 7904	154
155	107.6811 4203	101.8381 5017	99.0874 8808	96.4438 2021	155
156	108.1404 3983	102.2417 4005	99.4658 2666	96.7984 9687	156
157	108.5974 5257	102.6429 8931	99.8418 1532	97.1508 2468	157
158	109.0521 9161	103.0419 1152	100.2154 6864	97.5008 1919	158
159	109.5046 6827	103.4385 2019	100.5868 0113	97.8484 9586	159
160	109.9548 9380	103.8328 2872	100.9558 2721	98.1938 7003	160
161	110.4028 7940	104.2248 5046	101.3225 6120	98.5369 5695	161
162	110.8486 3622	104.6145 9866	101.6870 1734	98.8777 7178	162
163	111.2921 7534	105.0020 8652	102.0492 0978	99.2163 2956	163
164	111.7335 0780	105.3873 2715	102.4091 5258	99.5526 4523	164
165	112.1726 4458	105.7703 3357	102.7668 5971	99.8867 3364	165
166	112.6095 9660	106.1511 1874	103.1223 4505	100.2186 0955	166
167	113.0443 7473	106.5296 9555	103.4756 2241	100.5482 8760	167
168	113.4769 8978	106.9060 7680	103.8267 0550	100.8757 8236	168
169	113.9074 5251	107.2802 7523	104.1756 0795	101.2011 0828	169
170	114.3357 7365	107.6523 0349	104.5223 4330	101.5242 7972	170
171	114.7619 6383	108.0221 7417	104.8669 2502	101.8453 1095	171
172	115.1860 3366	108.3898 9979	105.2093 6648	102.1642 1614	172
173	115.6079 9369	108.7554 9278	105.5496 8098	102.4810 0939	173
174	116.0278 5442	109.1189 6552	105.8878 8172	102.7957 0466	174
175	116.4456 2629	109.4803 3029	106.2239 8183	103.1083 1586	175
176	116.8613 1969	109.8395 9933	106.5579 9436	103.4188 5678	176
177	117.2749 4496	110.1967 8478	106.8899 3229	103.7273 4115	177
178	117.6865 1240	110.5518 9874	107.2198 0848	104.0337 8257	178
179	118.0960 3224	110.9049 5322	107.5476 3576	104.3381 9457	179
180	118.5035 1467	111.2559 6015	107.8734 2684	104.6405 9061	180
181	118.9089 6982	111.6049 3142	108.1971 9438	104.9409 8402	181
182	119.3124 0778	111.9518 7882	108.5189 5094	105.2393 8807	182
183	119.7138 3859	112.2968 1411	108.8387 0900	105.5358 1593	183
184	120.1132 7222	112.6397 4894	109.1564 8100	105.8302 8070	184
185	120.5107 1863	112.9806 9492	109.4722 7925	106.1227 9536	185
186	120.9061 8769	113.3196 6359	109.7861 1603	106.4133 7285	186
187	121.2996 8925	113.6566 6640	110.0980 0351	106.7020 2598	187
188	121.6912 3308	113.9917 1477	110.4079 5379	106.9887 6750	188
189	122.0808 2894	114.3248 2002	110.7159 7893	107.2736 1007	189
190	122.4684 8650	114.6559 9342	111.0220 9086	107.5565 6626	190
191	122.8542 1543	114.9852 4619	111.3263 0147	107.8376 4857	191
192	123.2380 2530	115.3125 8945	111.6286 2258	108.1168 6941	192
193	123.6199 2567	115.6380 3429	111.9290 6592	108.3942 4111	193
194	123.9999 2604	115.9615 9171	112.2276 4315	108.6697 7590	194
195	124.3780 3586	116.2832 7265	112.5243 6586	108.9434 8597	195
196	124.7542 6454	116.6030 8801	112.8192 4558	109.2153 8338	196
197	125.1286 2143	116.9210 4859	113.1122 9374	109.4854 8015	197
198	125.5011 1585	117.2371 6516	113.4035 2173	109.7537 8819	198
199	125.8717 5707	117.5514 4842	113.6929 4085	110.0203 1937	199
200	126.2405 5430	117.8639 0899	113.9805 6234	110.2850 8543	200

Present Value of 1 per Annum at Compound Interest

$$a_{\overline{n|}} = (1-v^n)/i$$

n	¾%	⅞%	1%	1⅛%	n
1	0.9925 5583	0.9913 2590	0.9900 9901	0.9888 7515	1
2	1.9777 2291	1.9740 5294	1.9703 9506	1.9667 4923	2
3	2.9555 5624	2.9482 5570	2.9409 8521	2.9337 4460	3
4	3.9261 1041	3.9140 0813	3.9019 6555	3.8899 8230	4
5	4.8894 3961	4.8713 8352	4.8534 3124	4.8355 8200	5
6	5.8455 9763	5.8204 5454	5.7954 7647	5.7706 6205	6
7	6.7946 3785	6.7612 9323	6.7281 9453	6.6953 3948	7
8	7.7366 1325	7.6939 7098	7.6516 7775	7.6097 3002	8
9	8.6715 7642	8.6185 5859	8.5660 1758	8.5139 4810	9
10	9.5995 7958	9.5351 2624	9.4713 0453	9.4081 0690	10
11	10.5206 7452	10.4437 4348	10.3676 2825	10.2923 1832	11
12	11.4349 1267	11.3444 7929	11.2550 7747	11.1666 9302	12
13	12.3423 4508	12.2374 0202	12.1337 4007	12.0313 4044	13
14	13.2430 2242	13.1225 7945	13.0037 0304	12.8863 6880	14
15	14.1369 9495	14.0000 7876	13.8650 5252	13.7318 8509	15
16	15.0243 1261	14.8699 6656	14.7178 7378	14.5679 9514	16
17	15.9050 2492	15.7323 0885	15.5622 5127	15.3948 0360	17
18	16.7791 8107	16.5871 7111	16.3982 6858	16.2124 1395	18
19	17.6468 2984	17.4346 1820	17.2260 0850	17.0209 2850	19
20	18.5080 1969	18.2747 1445	18.0455 5297	17.8204 4845	20
21	19.3627 9870	19.1075 2361	18.8569 8313	18.6110 7387	21
22	20.2112 1459	19.9331 0891	19.6603 7934	19.3929 0371	22
23	21.0533 1473	20.7515 3300	20.4558 2113	20.1660 3580	23
24	21.8891 4614	21.5628 5799	21.2433 8726	20.9305 6693	24
25	22.7187 5547	22.3671 4547	22.0231 5570	21.6865 9276	25
26	23.5421 8905	23.1644 5647	22.7952 0366	22.4342 0792	26
27	24.3594 9286	23.9548 5152	23.5596 0759	23.1735 0598	27
28	25.1707 1251	24.7383 9060	24.3164 4316	23.9045 7946	28
29	25.9758 9331	25.5151 3319	25.0657 8530	24.6275 1986	29
30	26.7750 8021	26.2851 3823	25.8077 0822	25.3424 1766	30
31	27.5683 1783	27.0484 6417	26.5422 8537	26.0493 6233	31
32	28.3556 5045	27.8051 6894	27.2695 8947	26.7484 4236	32
33	29.1371 2203	28.5553 0998	27.9896 9255	27.4397 4522	33
34	29.9127 7621	29.2989 4422	28.7026 6589	28.1233 5745	34
35	30.6826 5629	30.0361 2809	29.4085 8009	28.7993 6460	35
36	31.4468 0525	30.7669 1757	30.1075 0504	29.4678 5127	36
37	32.2052 6576	31.4913 6810	30.7995 0994	30.1289 0114	37
38	32.9580 8016	32.2095 3467	31.4846 6330	30.7825 9692	38
39	33.7052 9048	32.9214 7179	32.1630 3298	31.4290 2044	39
40	34.4469 3844	33.6272 3350	32.8346 8611	32.0682 5260	40
41	35.1830 6545	34.3268 7335	33.4996 8922	32.7903 7340	41
42	35.9137 1260	35.0204 4446	34.1581 0814	33.3254 6195	42
43	36.6389 2070	35.7079 9947	34.8100 0806	33.9435 9649	43
44	37.3587 3022	36.3895 9055	35.4554 5352	34.5548 5438	44
45	38.0731 8136	37.0652 6944	36.0945 0844	35.1593 1212	45
46	38.7823 1401	37.7350 8743	36.7272 3608	35.7570 4536	46
47	39.4861 6774	38.3990 9535	37.3536 9909	36.3481 2891	47
48	40.1847 8189	39.0573 4359	37.9739 5949	36.9326 3674	48
49	40.8781 9542	39.7098 8212	38.5880 7871	37.5106 4202	49
50	41.5664 4707	40.3567 6047	39.1961 1753	38.0822 1708	50

Present Value of 1 per Annum at Compound Interest

$$a_{\overline{n}|} = (1-v^n)/i$$

n	¾%	⅞%	1%	1⅛%	n
51	42.2495 7525	40.9980 2772	39.7981 3617	38.6474 3345	51
52	42.9276 1812	41.6337 3256	40.3941 9423	39.2063 6188	52
53	43.6006 1351	42.2639 2324	40.9843 5072	39.7590 7232	53
54	44.2685 9902	42.8886 4757	41.5686 6408	40.3056 3394	54
55	44.9316 1193	43.5079 5298	42.1471 9216	40.8461 1514	55
56	45.5896 8926	44.1218 8647	42.7199 9224	41.3805 8358	56
57	46.2428 6776	44.7304 9465	43.2871 2102	41.9091 0613	57
58	46.8911 8388	45.3338 2369	43.8486 3468	42.4317 4896	58
59	47.5346 7382	45.9319 1939	44.4045 8879	42.9485 7746	59
60	48.1733 7352	46.5248 2716	44.9550 3841	43.4596 5633	60
61	48.8073 1863	47.1125 9198	45.5000 3803	43.9650 4952	61
62	49.4365 4455	47.6952 5847	46.0396 4161	44.4648 2029	62
63	50.0610 8640	48.2728 7085	46.5739 0258	44.9590 3119	63
64	50.6809 7906	48.8454 7296	47.1028 7385	45.4477 4407	64
65	51.2962 5713	49.4131 0826	47.6266 0777	45.9310 2009	65
66	51.9069 5497	49.9758 1984	48.1451 5621	46.4089 1975	66
67	52.5131 0667	50.5336 5040	48.6585 7050	46.8815 0284	67
68	53.1147 4607	51.0866 4228	49.1669 0149	47.3488 2852	68
69	53.7119 0677	51.6348 3745	49.6701 9949	47.8109 5527	69
70	54.3046 2210	52.1782 7752	50.1685 1435	48.2679 4094	70
71	54.8929 2516	52.7170 0374	50.6618 9539	48.7198 4270	71
72	55.4768 4880	53.2510 5699	51.1503 9148	49.1667 1714	72
73	56.0564 2561	53.7804 7781	51.6340 5097	49.6086 2016	73
74	56.6316 8795	54.3053 0638	52.1129 2175	50.0456 0708	74
75	57.2026 6794	54.8255 8253	52.5870 5124	50.4777 3259	75
76	57.7693 9746	55.3413 4575	53.0564 8637	50.9050 5077	76
77	58.3319 0815	55.8526 3520	53.5212 7364	51.3276 1510	77
78	58.8902 3141	56.3594 8966	53.9814 5905	51.7454 7847	78
79	59.4443 9842	56.8619 4762	54.4370 8817	52.1586 9317	79
80	59.9944 4012	57.3600 4721	54.8882 0611	52.5673 1092	80
81	60.5403 8722	57.8538 2623	55.3348 5753	52.9713 8286	81
82	61.0822 7019	58.3433 2216	55.7770 8666	53.3709 5957	82
83	61.6201 1930	58.8285 7215	56.2149 3729	53.7660 9104	83
84	62.1539 6456	59.3096 1304	56.6484 5276	54.1568 2674	84
85	62.6838 3579	59.7864 8133	57.0776 7600	54.5432 1557	85
86	63.2097 6257	60.2592 1321	57.5026 4951	54.9253 0588	86
87	63.7317 7427	60.7278 4457	57.9234 1535	55.3031 4549	87
88	64.2499 0002	61.1924 1097	58.3400 1520	55.6767 8169	88
89	64.7641 6875	61.6529 4768	58.7524 9030	56.0462 6126	89
90	65.2746 0918	62.1094 8965	59.1608 8148	56.4116 3041	90
91	65.7812 4981	62.5620 7152	59.5652 2919	56.7729 3490	91
92	66.2841 1892	63.0107 2765	59.9655 7346	57.1302 1992	92
93	66.7832 4458	63.4554 9210	60.3619 5392	57.4835 3021	93
94	67.2786 5467	63.8963 9861	60.7544 0982	57.8329 0997	94
95	67.7703 7685	64.3334 8065	61.1429 8002	58.1784 0294	95
96	68.2584 3856	64.7667 7140	61.5277 0299	58.5200 5235	96
97	68.7428 6705	65.1963 0375	61.9086 1682	58.8579 0096	97
98	69.2236 8938	65.6221 1028	62.2857 5923	59.1919 9106	98
99	69.7009 3239	66.0442 2333	62.6591 6755	59.5223 6446	99
100	70.1746 2272	66.4626 7492	63.0288 7877	59.8490 6251	100

Present Value of 1 per Annum at Compound Interest

$$a_{\overline{n|}} = (1 - v^n)/i$$

n	¾%	⅞%	1%	1⅛%	*n*
101	70.6447 8682	66.8774 9683	63.3949 2947	60.1721 2609	101
102	71.1114 5094	67.2887 2052	63.7573 5591	60.4915 9564	102
103	71.5746 4113	67.6963 7722	64.1161 9397	60.8075 1114	103
104	72.0343 8325	68.1004 9786	64.4714 7918	61.1199 1213	104
105	72.4907 0298	68.5011 1312	64.8232 4671	61.4288 3770	105
106	72.9436 2579	68.8982 5341	65.1715 3140	61.7343 2653	106
107	73.3931 7696	69.2919 4885	65.5163 6772	62.0364 1684	107
108	73.8393 8160	69.6822 2935	65.8577 8983	62.3351 4644	108
109	74.2822 6461	70.0691 2451	66.1958 3151	62.6305 5273	109
110	74.7218 5073	70.4526 6370	66.5305 2625	62.9226 7266	110
111	75.1581 6450	70.8328 7604	66.8619 0718	63.2115 4280	111
112	75.5912 3027	71.2097 9037	67.1900 0710	63.4971 9931	112
113	76.0210 7223	71.5834 3531	67.5148 5852	63.7796 7793	113
114	76.4477 1437	71.9538 3922	67.8364 9358	64.0590 1402	114
115	76.8711 8052	72.3210 3020	68.1549 4414	64.3352 4255	115
116	77.2914 9431	72.6850 3614	68.4702 4172	64.6083 9807	116
117	77.7086 7922	73.0458 8465	68.7824 1755	64.8785 1478	117
118	78.1227 5853	73.4036 0312	69.0915 0252	65.1456 2648	118
119	78.5337 5536	73.7582 1871	69.3975 2725	65.4097 6660	119
120	78.9416 9267	74.1097 5832	69.7005 2203	65.6709 6821	120
121	79.3465 9322	74.4582 4864	70.0005 1686	65.9292 6399	121
122	79.7484 7962	74.8037 1613	70.2975 4145	66.1846 8627	122
123	80.1473 7432	75.1461 8699	70.5916 2520	66.4372 6702	123
124	80.5432 9957	75.4856 8723	70.8827 9722	66.6870 3784	124
125	80.9362 7749	75.8222 4261	71.1710 8636	66.9340 3000	125
126	81.3263 3001	76.1558 7867	71.4565 2115	67.1782 7442	126
127	81.7134 7892	76.4866 2074	71.7391 2985	67.4198 0165	127
128	82.0977 4583	76.8144 9392	72.0189 4045	67.6586 4193	128
129	82.4791 5219	77.1395 2309	72.2959 8064	67.8948 2514	129
130	82.8577 1929	77.4617 3292	72.5702 7786	68.1283 8086	130
131	83.2334 6828	77.7811 4788	72.8418 5927	68.3593 3830	131
132	83.6064 2013	78.0977 9220	73.1107 5175	68.5877 2638	132
133	83.9765 9566	78.4116 8991	73.3769 8193	68.8135 7368	133
134	84.3440 1554	78.7228 6485	73.6405 7617	69.0369 0846	134
135	84.7087 0029	79.0313 4061	73.9015 6056	69.2577 5867	135
136	85.0706 7026	79.3371 4063	74.1599 6095	69.4761 5196	136
137	85.4299 4567	79.6402 8811	74.4158 0293	69.6921 1566	137
138	85.7865 4657	79.9408 0606	74.6691 1181	69.9056 7680	138
139	86.1404 9288	80.2387 1728	74.9199 1268	70.1168 6210	139
140	86.4918 0434	80.5340 4440	75.1682 3038	70.3256 9800	140
141	86.8405 0059	80.8268 0981	75.4140 8948	70.5322 1063	141
142	87.1866 0108	81.1170 3575	75.6575 1434	70.7364 2584	142
143	87.5301 2514	81.4047 4423	75.8985 2905	70.9383 6918	143
144	87.8710 9195	81.6899 5711	76.1371 5747	71.1380 6594	144
145	88.2095 2055	81.9726 9602	76.3734 2324	71.3355 4110	145
146	88.5454 2982	82.2529 8242	76.6073 4974	71.5308 1939	146
147	88.8788 3854	82.5308 3759	76.8389 6014	71.7239 2523	147
148	89.2097 6530	82.8062 8262	77.0682 7737	71.9148 8280	148
149	89.5382 2858	83.0793 3841	77.2953 2413	72.1037 1599	149
150	89.8642 4673	83.3500 2569	77.5201 2290	72.2904 4845	150

Present Value of 1 per Annum at Compound Interest

$$a_{\overline{n}|} = (1 - v^n)/i$$

n	¾%	⅞%	1%	1⅛%	*n*
151	90.1878 3795	83.6183 6499	77.7426 9594	72.4751 0353	151
152	90.5090 2029	83.8843 7670	77.9630 6529	72.6577 0436	152
153	90.8278 1171	84.1480 8099	78.1812 5276	72.8382 7378	153
154	91.1442 2998	84.4094 9788	78.3972 7996	73.0168 3439	154
155	91.4582 9279	84.6686 4722	78.6111 6828	73.1934 0854	155
156	91.7700 1765	84.9255 4867	78.8229 3889	73.3680 1834	156
157	92.0794 2199	85.1802 2173	79.0326 1276	73.5406 8562	157
158	92.3865 2307	85.4326 8573	79.2402 1065	73.7114 3201	158
159	92.6913 3803	85.6829 5983	79.4457 5312	73 8802 7888	159
160	92.9938 8390	85.9310 6303	79.6492 6052	74.0472 4734	160
161	93.2941 7757	86.1770 1415	79.8507 5299	74.2123 5831	161
162	93.5922 3580	86.4208 3187	80.0502 5048	74.3756 3245	162
163	93.8880 7524	86.6625 3470	80.2477 7275	74.5370 9018	163
164	94.1817 1239	86.9021 4096	80.4433 3936	74.6967 5173	164
165	94.4731 6367	87.1396 6886	80.6369 6966	74.8546 3706	165
166	94.7624 4533	87.3751 3642	80.8286 8284	75.0107 6594	166
167	95.0495 7352	87.6085 6150	81.0184 9786	75.1651 5792	167
168	95.3345 6429	87.8399 6184	81.2064 3352	75.3178 3230	168
169	95.6174 3354	88.0693 5498	81.3925 0844	75.4688 0821	169
170	95.8981 9706	88.2967 5835	81.5767 4103	75.6181 0453	170
171	96.1768 7053	88.5221 8919	81.7591 4953	75.7657 3996	171
172	96.4534 6951	88.7456 6462	81.9397 5201	75.9117 3296	172
173	96.7280 0944	88.9672 0161	82.1185 6635	76.0561 0182	173
174	97.0005 0565	89.1868 1696	82.2956 1025	76.1988 6459	174
175	97.2709 7335	89.4045 2735	82.4709 0123	76.3400 3915	175
176	97.5394 2764	89.6203 4929	82.6444 5667	76.4796 4317	176
177	97.8058 8352	89.8342 9917	82.8162 9373	76.6176 9411	177
178	98.0703 5585	90.0463 9323	82.9864 2944	76.7542 0925	178
179	98.3328 5940	90.2566 4757	83.1548 8063	76.8892 0569	179
180	98.5934 0884	90.4650 7813	83.3216 6399	77.0227 0031	180
181	98.8520 1869	90.6717 0075	83.4867 9603	77.1547 0982	181
182	99.1087 0342	90.8765 3110	83.6502 9310	77.2852 5075	182
183	99.3634 7734	91.0795 8474	83.8121 7138	77.4143 3943	183
184	99.6163 5468	91.2808 7706	83.9724 4691	77.5419 9202	184
185	99.8673 4956	91.4804 2336	84.1311 3556	77.6682 2450	185
186	100.1164 7599	91.6782 3877	84.2882 5303	77.7930 5266	186
187	100.3637 4788	91.8743 3831	84.4438 1488	77.9164 9212	187
188	100.6091 7904	92.0687 3686	84.5978 3651	78.0385 5834	188
189	100.8527 8316	92.2614 4918	84.7503 3318	78.1592 6659	189
190	101.0945 7386	92.4524 8989	84.9013 1998	78.2786 3198	190
191	101.3345 6462	92.6418 7350	85.0508 1186	78.3966 6945	191
192	101.5727 6886	92.8296 1438	85.1988 2363	78.5133 9377	192
193	101.8091 9986	93.0157 2677	85.3453 6993	78.6288 1955	193
194	102.0438 7083	93.2002 2480	85.4904 6528	78.7429 6123	194
195	102.2767 9487	93.3831 2248	85.6341 2404	78.8558 3311	195
196	102.5078 9849	93.5644 3368	85.7763 6043	78.9674 4931	196
197	102.7374 5407	93.7441 7218	85.9171 8855	79.0778 2379	197
198	102.9652 1496	93.9223 5160	86.0566 2232	79.1869 7037	198
199	103.1912 8036	94.0989 8548	86.1946 7557	79.2949 0272	199
200	103.4156 6289	94.2740 8721	86.3313 6195	79.4016 3433	200

Present Value of 1 per Annum at Compound Interest

$$a_{\overline{n|}} = (1 - v^n)/i$$

n	1¼%	1⅜%	1½%	1¾%	n
1	0.9876 5432	0.9864 3650	0.9852 2167	0.9828 0098	1
2	1.9631 1538	1.9594 9346	1.9558 8342	1.9486 9875	2
3	2.9265 3371	2.9193 5237	2.9122 0042	2.8979 8403	3
4	3.8780 5798	3.8661 9222	3.8543 8465	3.8309 4254	4
5	4.8178 3504	4.8001 8962	4.7826 4497	4.7478 5508	5
6	5.7460 0992	5.7215 1874	5.6971 8717	5.6489 9762	6
7	6.6627 2585	6.6303 5140	6.5982 1396	6.5346 4139	7
8	7.5681 2429	7.5268 5712	7.4859 2508	7.4050 5297	8
9	8.4623 4498	8.4112 0308	8.3605 1732	8.2604 9432	9
10	9.3455 2591	9.2835 5421	9.2221 8455	9.1012 2291	10
11	10.2178 0337	10.1440 7320	10.0711 1779	9.9274 9181	11
12	11.0793 1197	10.9929 2054	10.9075 0521	10.7395 4969	12
13	11.9301 8466	11.8302 5454	11.7315 3222	11.5376 4097	13
14	12.7705 5275	12.6562 3136	12.5433 8150	12.3220 0587	14
15	13.6005 4592	13.4710 0504	13.3432 3301	13.0928 8046	15
16	14.4202 9227	14.2747 2754	14.1312 6405	13.8504 9677	16
17	15.2299 1829	15.0675 4874	14.9076 4931	14.5950 8282	17
18	16.0295 4893	15.8496 1651	15.6725 6089	15.3268 6272	18
19	16.8193 0759	16.6210 7671	16.4261 6837	16.0460 5673	19
20	17.5993 1613	17.3820 7320	17.1686 3879	16.7528 8130	20
21	18.3696 9495	18.1327 4792	17.9001 3673	17.4475 4919	21
22	19.1305 6291	18.8732 4086	18.6208 2437	18.1302 6948	22
23	19.8820 3744	19.6036 9012	19.3308 6145	18.8012 4764	23
24	20.6242 3451	20.3242 3193	20.0304 0537	19.4606 8565	24
25	21.3572 6865	21.0350 0067	20.7196 1120	20.1087 8196	25
26	22.0812 5299	21.7361 2890	21.3986 3172	20.7457 3166	26
27	22.7962 9925	22.4277 4737	22.0676 1746	21.3717 2644	27
28	23.5025 1778	23.1099 8508	22.7267 1671	21.9869 5474	28
29	24.2000 1756	23.7829 6925	23.3760 7558	22.5916 0171	29
30	24.8889 0623	24.4468 2540	24.0158 3801	23.1858 4934	30
31	25.5692 9010	25.1016 7734	24.6461 4582	23.7698 7650	31
32	26.2412 7418	25.7476 4719	25.2671 3874	24.3438 5897	32
33	26.9049 6215	26.3848 5543	25.8789 5442	24.9079 6951	33
34	27.5604 5644	27.0134 2089	26.4817 2849	25.4623 7789	34
35	28.2078 5822	27.6334 6080	27.0755 9458	26.0072 5100	35
36	28.8472 6737	28.2450 9080	27.6606 8431	26.5427 5283	36
37	29.4787 8259	28.8484 2496	28.2371 2740	27.0690 4455	37
38	30.1025 0133	29.4435 7579	28.8050 5163	27.5862 8457	38
39	30.7185 1983	30.0306 5430	29.3645 8288	28.0946 2857	39
40	31.3269 3316	30.6097 6996	29.9158 4520	28.5942 2955	40
41	31.9278 3522	31.1810 3079	30.4589 6079	29.0852 3789	41
42	32.5213 1874	31.7445 4332	30.9940 5004	29.5678 0135	42
53	33.1074 7530	32.3004 1264	31.5212 3157	30.0420 6522	43
44	33.6863 9536	32.8487 4243	32.0406 2223	30.5081 7221	44
45	34.2581 6825	33.3896 3495	32.5523 3718	30.9662 6261	45
46	34.8228 8222	33.9231 9108	33.0564 8983	31.4164 7431	46
47	35.3806 2442	34.4495 1031	33.5531 9195	31.8589 4281	47
48	35.9314 8091	34.9686 9081	34.0425 5365	32.2938 0129	48
49	36.4755 3670	35.4808 2941	34.5246 8339	32.7211 8063	49
50	37.0128 7574	35.9860 2161	34.9996 8807	33.1412 0946	50

Present Value of 1 per Annum at Compound Interest

$$a_{\overline{n|}} = (1 - v^n)/i$$

n	1¼%	1⅜%	1½%	1¾%	n
51	37.5435 8099	36.4843 6164	35.4676 7298	33.5540 1421	51
52	38.0677 3431	36.9759 4243	35.9287 4185	33.9597 1913	52
53	38.5854 1660	37.4608 5566	36.3829 9690	34.3584 4633	53
54	39.0967 0776	37.9391 9178	36.8305 3882	34.7503 1579	54
55	39.6016 8667	38.4110 3998	37.2714 6681	35.1354 4550	55
56	40.1004 3128	38.8764 8826	37.7058 7863	35.5139 5135	56
57	40.5930 1855	39.3356 2344	38.1338 7058	35.8859 4727	57
58	41.0795 2449	39.7885 3114	38.5555 3751	36.2515 4523	58
59	41.5600 2419	40.2352 9582	38.9709 7292	36.6108 5526	59
60	42.0345 9179	40.6760 0081	39.3802 6889	36.9639 8552	60
61	42.5033 0054	41.1107 2829	39.7835 1614	37.3110 4228	61
62	42.9662 2275	41.5395 5935	40.1808 0408	37.6521 3000	62
63	43.4234 2988	41.9625 7396	40.5722 2077	37.9873 5135	63
64	43.8749 9247	42.3798 5101	40.9578 5298	38.3168 0723	64
65	44.3209 8022	42.7914 6832	41.3377 8618	38.6405 9678	65
66	44.7614 6195	43.1975 0266	41.7121 0461	38.9588 1748	66
67	45.1965 0563	43.5980 2975	42.0808 9125	39.2715 6509	67
68	45.6261 7840	43.9931 2429	42.4442 2783	39.5789 3375	68
69	46.0505 4656	44.3828 5997	42.8021 9490	39.8810 1597	69
70	46.4696 7562	44.7673 0946	43.1548 7183	40.1779 0267	70
71	46.8836 3024	45.1465 4448	43.5023 3678	40.4696 8321	71
72	47.2924 7431	45.5206 3573	43.8446 6677	40.7564 4542	72
73	47.6962 7093	45.8896 5300	44.1819 3771	41.0382 7560	73
74	48.0950 8240	46.2536 6511	44.5142 2434	41.3152 5857	74
75	48.4889 7027	46.6127 3994	44.8416 0034	41.5874 7771	75
76	48.8779 9533	46.9669 4445	45.1641 3826	41.8550 1495	76
77	49.2622 1761	47.3163 4471	45.4819 0962	42.1179 5081	77
78	49.6416 9640	47.6610 0588	45.7949 8485	42.3763 6443	78
79	50.0164 9027	48.0009 9224	46.1034 3335	42.6303 3359	79
80	50.3866 5706	48.3363 6719	46.4073 2349	42.8799 3474	80
81	50.7522 5389	48.6671 9328	46.7067 2265	43.1252 4298	81
82	51.1133 3717	48.9935 3221	47.0016 9720	43.3663 3217	82
83	51.4699 6264	49.3154 4484	47.2923 1251	43.6032 7486	83
84	51.8221 8532	49.6329 9122	47.5786 3301	43.8361 4237	84
85	52.1700 5958	49.9462 3055	47.8607 2218	44.0650 0479	85
86	52.5136 3909	50.2552 2125	48.1386 4254	44.2899 3099	86
87	52.8529 7688	50.5600 2096	48.4124 5571	44.5109 8869	87
88	53.1881 2531	50.8606 8653	48.6822 2237	44.7282 4441	88
89	53.5191 3611	51.1572 7401	48.9480 0234	44.9417 6355	89
90	53.8460 6035	51.4498 3873	49.2098 5452	45.1516 1037	90
91	54.1689 4850	51.7384 3524	49.4678 3696	45.3578 4803	91
92	54.4878 5037	52.0231 1738	49.7220 0686	45.5605 3860	92
93	54.8028 1518	52.3039 3823	49.9724 2055	45.7597 4310	93
94	55.1138 9154	52.5809 5016	50.2191 3355	45.9555 2147	94
95	55.4211 2744	52.8542 0484	50.4622 0054	46.1479 3265	95
96	55.7245 7031	53.1237 5324	50.7016 7541	46.3370 3455	96
97	56.0242 6698	53.3896 4561	50.9376 1124	46.5228 8408	97
98	56.3202 6368	53.6519 3155	51.1700 6034	46.7055 3718	98
99	56.6126 0610	53.9106 5998	51.3990 7422	46.8850 4882	99
100	56.9013 3936	54.1658 7914	51.6247 0367	47.0614 7304	100

Present Value of 1 per Annum at Compound Interest

$$a_{\overline{n}} = (1-v^n)/i$$

n	2%	2¼%	2½%	2¾%	n
1	0.9803 9216	0.9779 9511	0.9756 0976	0.9732 3601	1
2	1.9415 6094	1.9344 6955	1.9274 2415	1.9204 2434	2
3	2.8838 8327	2.8698 9687	2.8560 2356	2.8422 6213	3
4	3.8077 2870	3.7847 4021	3.7619 7421	3.7394 2787	4
5	4.7134 5951	4.6794 5253	4.6458 2850	4.6125 8186	5
6	5.6014 3089	5.5544 7680	5.5081 2536	5.4623 6678	6
7	6.4719 9107	6.4102 4626	6.3493 9060	6.2894 0806	7
8	7.3254 8144	7.2471 8461	7.1701 3717	7.0943 1441	8
9	8.1622 3671	8.0657 0622	7.9708 6553	7.8776 7826	9
10	8.9825 8501	8.8662 1635	8.7520 6393	8.6400 7616	10
11	9.7868 4805	9.6491 1134	9.5142 0871	9.3820 6926	11
12	10.5753 4122	10.4147 7882	10.2577 6460	10.1042 0366	12
13	11.3483 7375	11.1635 9787	10.9831 8497	10.8070 1086	13
14	12.1062 4877	11.8959 3924	11.6909 1217	11.4910 0814	14
15	12.8492 6350	12.6121 6551	12.3813 7773	12.1566 9892	15
16	13.5777 0931	13.3126 3131	13.0550 0266	12.8045 7315	16
17	14.2918 7188	13.9976 8343	13.7121 9772	13.4351 0769	17
18	14.9920 3125	14.6676 6106	14.3533 6363	14.0487 6661	18
19	15.6784 6201	15.3228 9590	14.9788 9134	14.6460 0157	19
20	16.3514 3334	15.9637 1237	15.5891 6229	15.2272 5213	20
21	17.0112 0916	16.5904 2775	16.1845 4857	15.7929 4612	21
22	17.6580 4820	17.2033 5232	16.7654 1324	16.3434 9987	22
23	18.2922 0412	17.8027 8955	17.3321 1048	16.8793 1861	23
24	18.9139 2560	18.3890 3624	17.8849 8583	17.4007 9670	24
25	19.5234 5647	18.9623 8263	18.4243 7642	17.9083 1795	25
26	20.1210 3576	19.5231 1260	18.9506 1114	18.4022 5592	26
27	20.7068 9780	20.0715 0376	19.4640 1087	18.8829 7413	27
28	21.2812 7236	20.6078 2764	19.9648 8866	19.3508 2640	28
29	21.8443 8466	21.1323 4977	20.4535 4991	19.8061 5708	29
30	22.3964 5555	21.6453 2985	20.9302 9259	20.2493 0130	30
31	22.9377 0152	22.1470 2186	21.3954 0741	20.6805 8520	31
32	23.4683 3482	22.6376 7419	21.8491 7796	21.1003 2623	32
33	23.9885 6355	23.1175 2977	22.2918 8094	21.5088 3332	33
34	24.4985 9172	23.5868 2618	22.7237 8628	21.9064 0712	34
35	24.9986 1933	24.0457 9577	23.1451 5734	22.2933 4026	35
36	25.4888 4248	24.4946 6579	23.5562 5107	22.6699 1753	36
37	25.9694 5341	24.9336 5848	23.9573 1812	23.0364 1609	37
38	26.4406 4060	25.3629 9118	24.3486 0304	23.3931 0568	38
39	26.9025 8883	25.7828 7646	24.7303 4443	23.7402 4884	39
40	27.3554 7924	26.1935 2221	25.1027 7505	24.0781 0106	40
41	27.7994 8945	26.5951 3174	25.4661 2200	24.4069 1101	41
42	28.2347 9358	26.9879 0390	25.8206 0683	24.7269 2069	42
43	28.6615 6233	27.3720 3316	26.1664 4569	25.0383 6563	43
44	29.0799 6307	27.7477 0969	26.5038 4945	25.3414 7507	44
45	29.4901 5987	28.1151 1950	26.8330 2386	25.6364 7209	45
46	29.8923 1360	28.4744 4450	27.1541 6962	25.9235 7381	46
47	30.2865 8196	28.8258 6259	27.4674 8255	26.2029 9154	47
48	30.6731 1957	29.1695 4777	27.7731 5371	26.4749 3094	48
49	31.0520 7801	29.5056 7019	28.0713 6947	26.7395 9215	49
50	31.4236 0589	29.8343 9627	28.3623 1168	26.9971 6998	50

Present Value of 1 per Annum at Compound Interest

$$a_{\overline{n}|}=(1-v^n)/i$$

n	2%	2¼%	2½%	2¾%	*n*
51	31.7878 4892	30.1558 8877	28.6461 5774	27.2478 5400	51
52	32.1449 4992	30.4703 0687	28.9230 8072	27.4918 2871	52
53	32.4950 4894	30.7778 0623	29.1932 4948	27.7292 7368	53
54	32.8382 8327	31.0785 3910	29.4568 2876	27.9603 6368	54
55	33.1747 8752	31.3726 5438	29.7139 7928	28.1852 6879	55
56	33.5046 9365	31.6602 9768	29.9648 5784	28.4041 5454	56
57	33.8281 3103	31.9416 1142	30.2096 1740	28.6171 8203	57
58	34.1452 2650	32.2167 3489	30.4484 0722	28.8245 0806	58
59	34.4561 0441	32.4858 0429	30.6813 7290	29.0262 8522	59
60	34.7608 8668	32.7489 5285	30.9086 5649	29.2226 6201	60
61	35.0596 9282	33.0063 1086	31.1303 9657	29.4137 8298	61
62	35.3526 4002	33.2580 0573	31.3467 2836	29.5997 8879	62
63	35.6398 4316	33.5041 6208	31.5577 8377	29.7808 1634	63
64	35.9214 1486	33.7449 0179	31.7636 9148	29.9569 9887	64
65	36.1974 6555	33.9803 4405	31.9645 7705	30.1284 6605	65
66	36.4681 0348	34.2106 0543	32.1605 6298	30.2953 4409	66
67	36.7334 3478	34.4357 9993	32.3517 6876	30.4577 5581	67
68	36.9935 6351	34.6560 3905	32.5383 1099	30.6158 2074	68
69	37.2485 9168	34.8714 3183	32.7203 0340	30.7696 5522	69
70	37.4986 1929	35.0820 8492	32.8978 5698	30.9193 7247	70
71	37.7437 4441	35.2881 0261	33.0710 7998	31.0650 8270	71
72	37.9840 6314	35.4895 8691	33.2400 7803	31.2068 9314	72
73	38.2196 6975	35.6866 3756	33.4049 5417	31.3449 0816	73
74	38.4506 5662	35.8793 5214	33.5658 0895	31.4792 2936	74
75	38.6771 1433	36.0678 2605	33.7227 4044	31.6099 5558	75
76	38.8991 3170	36.2521 5262	33.8758 4433	31.7371 8304	76
77	39.1167 9578	36.4324 2310	34.0252 1398	31.8610 0540	77
78	39.3301 9194	36.6087 2675	34.1709 4047	31.9815 1377	78
79	39.5394 0386	36.7811 5085	34.3131 1265	32.0987 9685	79
80	39.7445 1359	36.9497 8079	34.4518 1722	32.2129 4098	80
81	39.9456 0156	37.1147 0004	34.5871 3875	32.3240 3015	81
82	40.1427 4663	37.2759 9026	34.7191 5976	32.4321 4613	82
83	40.3360 2611	37.4337 3130	34.8479 6074	32.5373 6850	83
84	40.5255 1579	37.5880 0127	34.9736 2023	32.6397 7469	84
85	40.7112 8999	37.7388 7655	35.0962 1486	32.7394 4009	85
86	40.8934 2156	37.8864 3183	35.2158 1938	32.8364 3804	86
87	41.0719 8192	38.0307 4018	35.3325 0671	32.9308 3994	87
88	41.2470 4110	38.1718 7304	35.4463 4801	33.0227 1527	88
89	41.4186 6774	38.3099 0028	35.5574 1269	33.1121 3165	89
90	41.5869 2916	38.4448 9025	35.6657 6848	33.1991 5489	90
91	41.7518 9133	38.5769 0978	35.7714 8144	33.2838 4905	91
92	41.9136 1895	38.7060 2423	35.8746 1604	33.3662 7644	92
93	42.0721 7545	38.8322 9754	35.9752 3516	33.4464 9776	93
94	42.2276 2299	38.9557 9221	36.0734 0016	33.5245 7202	94
95	42.3800 2254	39.0765 6940	36.1691 7089	33.6005 5671	95
96	42.5294 3386	39.1946 8890	36.2626 0574	33.6745 0775	96
97	42.6759 1555	39.3102 0920	36.3537 6170	33.7464 7956	97
98	42.8195 2505	39.4231 8748	36.4426 9434	33.8165 2512	98
99	42.9603 1867	39.5336 7968	36.5294 5790	33.8846 9598	99
100	43.0983 5164	39.6417 4052	36.6141 0526	33.9510 4232	100

Present Value of 1 per Annum at Compound Interest

$$a_{\overline{n}|} = (1-v^n)/i$$

n	3%	3½%	4%	4½%	*n*
1	0.9708 7379	0.9661 8357	0.9615 3846	0.9569 3780	1
2	1.9134 6970	1.8996 9428	1.8860 9467	1.8726 6775	2
3	2.8286 1135	2.8016 3698	2.7750 9103	2.7489 6435	3
4	3.7170 9840	3.6730 7921	3.6298 9522	3.5875 2570	4
5	4.5797 0719	4.5150 5238	4.4518 2233	4.3899 7674	5
6	5.4171 9144	5.3285 5302	5.2421 3686	5.1578 7248	6
7	6.2302 8296	6.1145 4398	6.0020 5467	5.8927 0094	7
8	7.0196 9219	6.8739 5554	6.7327 4487	6.5958 8607	8
9	7.7861 0892	7.6076 8651	7.4353 3161	7.2687 9050	9
10	8.5302 0284	8.3166 0532	8.1108 9578	7.9127 1818	10
11	9.2526 2411	9.0015 5104	8.7604 7671	8.5289 1692	11
12	9.9540 0399	9.6633 3433	9.3850 7376	9.1185 8078	12
13	10.6349 5533	10.3027 3849	9.9856 4785	9.6828 5242	13
14	11.2960 7314	10.9205 2028	10.5631 2293	10.2228 2528	14
15	11.9379 3509	11.5174 1090	11.1183 8743	10.7395 4573	15
16	12.5611 0203	12.0941 1681	11.6522 9561	11.2340 1505	16
17	13.1661 1847	12.6513 2059	12.1656 6885	11.7071 9143	17
18	13.7535 1308	13.1896 8173	12.6592 9697	12.1599 9180	18
19	14.3237 9911	13.7098 3742	13.1339 3940	12.5932 9359	19
20	14.8774 7486	14.2124 0330	13.5903 2634	13.0079 3645	20
21	15.4150 2414	14.6979 7420	14.0291 5995	13.4047 2388	21
22	15.9369 1664	15.1671 2484	14.4511 1533	13.7844 2476	22
23	16.4436 0839	15.6204 1047	14.8568 4167	14.1477 7489	23
24	16.9355 4212	16.0583 6760	15.2469 6314	14.4954 7837	24
25	17.4131 4769	16.4815 1459	15.6220 7994	14.8282 0896	25
26	17.8768 4242	16.8903 5226	15.9827 6918	15.1466 1145	26
27	18.3270 3147	17.2853 6451	16.3295 8575	15.4513 0282	27
28	18.7641 0823	17.6670 1885	16.6630 6322	15.7428 7351	28
29	19.1884 5459	18.0357 6700	16.9837 1463	16.0218 8853	29
30	19.6004 4135	18.3920 4541	17.2920 3330	16.2888 8854	30
31	20.0004 2849	18.7362 7576	17.5884 9356	16.5443 9095	31
32	20.3887 6553	19.0688 6547	17.8735 5150	16.7888 9086	32
33	20.7657 9178	19.3902 0818	18.1476 4567	17.0228 6207	33
34	21.1318 3668	19.7006 8423	18.4111 9776	17.2467 5796	34
35	21.4872 2007	20.0006 6110	18.6646 1323	17.4610 1240	35
36	21.8322 5250	20.2904 9381	18.9082 8195	17.6660 4058	36
37	22.1672 3544	20.5705 2542	19.1425 7880	17.8622 3979	37
38	22.4924 6159	20.8410 8736	19.3678 6423	18.0499 9023	38
39	22.8082 1513	21.1024 9987	19.5844 8484	18.2296 5572	39
40	23.1147 7197	21.3550 7234	19.7927 7388	18.4015 8442	40
41	23.4123 9997	21.5991 0371	19.9930 5181	18.5661 0949	41
42	23.7013 5920	21.8348 8281	20.1856 2674	18.7235 4975	42
43	23.9819 0213	22.0626 8870	20.3707 9494	18.8742 1029	43
44	24.2542 7392	22.2827 9102	20.5488 4129	19.0183 8305	44
45	24.5187 1254	22.4954 5026	20.7200 3970	19.1563 4742	45
46	24.7754 4907	22.7009 1813	20.8846 5356	19.2883 7074	46
47	25.0247 0783	22.8994 3780	21.0429 3612	19.4147 0884	47
48	25.2667 0664	23.0912 4425	21.1951 3088	19.5356 0654	48
49	25.5016 5693	23.2765 6450	21.3414 7200	19.6512 9813	49
50	25.7297 6401	23.4556 1787	21.4821 8462	19.7620 0778	50

Present Value of 1 per Annum at Compound Interest

$$a_{\overline{n|}} = (1-v^n)/i$$

n	3%	3½%	4%	4½%	n
51	25.9512 2719	23.6286 1630	21.6174 8521	19.8679 5003	51
52	26.1662 3999	23.7957 6454	21.7475 8193	19.9693 3017	52
53	26.3749 9028	23.9572 6043	21.8726 7493	20.0663 4466	53
54	26.5776 6047	24.1132 9510	21.9929 5667	20.1591 8149	54
55	26.7744 2764	24.2640 5323	22.1086 1218	20.2480 2057	55
56	26.9654 6373	24.4097 1327	22.2189 1940	20.3330 3404	56
57	27.1509 3566	24.5504 4760	22.3267 4943	20.4143 8664	57
58	27.3310 0549	24.6864 2281	22.4295 6676	20.4922 3602	58
59	27.5058 3058	24.8177 9981	22.5284 2957	20.5667 3303	59
60	27.6755 6367	24.9447 3412	22.6234 8997	20.6380 2204	60
61	27.8403 5307	25.0673 7596	22.7148 9421	20.7062 4118	61
62	28.0003 4279	25.1858 7049	22.8027 8289	20.7715 2266	62
63	28.1556 7261	25.3003 5796	22.8872 9124	20.8339 9298	63
64	28.3064 7826	25.4109 7388	22.9685 4927	20.8937 7319	64
65	28.4528 9152	25.5178 4916	23.0466 8199	20.9509 7913	65
66	28.5950 4031	25.6211 1030	23.1218 0961	21.0057 2165	66
67	28.7330 4884	25.7208 7951	23.1940 4770	21.0581 0684	67
68	28.8670 3771	25.8172 7489	23.2635 0740	21.1082 3621	68
69	28.9971 2399	25.9104 1052	23.3302 9558	21.1562 0690	69
70	29.1234 2135	26.0003 9664	23.3945 1498	21.2021 1187	70
71	29.2460 4015	26.0873 3975	23.4562 6440	21.2460 4007	71
72	29.3650 8752	26.1713 4275	23.5156 3885	21.2880 7662	72
73	29.4806 6750	26.2525 0508	23.5727 2966	21.3283 0298	73
74	29.5928 8106	26.3309 2278	23.6276 2468	21.3667 9711	74
75	29.7018 2628	26.4066 8868	23.6804 0834	21.4036 3360	75
76	29.8075 9833	26.4798 9244	23.7311 6187	21.4388 8383	76
77	29.9102 8964	26.5506 2072	23.7799 6333	21.4726 1611	77
78	30.0099 8994	26.6189 5721	23.8268 8782	21.5048 9579	78
79	30.1067 8635	26.6849 8281	23.8720 0752	21.5357 8545	79
80	30.2007 6345	26.7487 7567	23.9153 9185	21.5653 4493	80
81	30.2920 0335	26.8104 1127	23.9571 0754	21.5936 3151	81
82	30.3805 8577	26.8699 6258	23.9972 1879	21.6207 0001	82
83	30.4665 8813	26.9275 0008	24.0357 8730	21.6466 0288	83
84	30.5500 8556	26.9830 9186	24.0728 7240	21.6713 9032	84
85	30.6311 5103	27.0368 0373	24.1085 3116	21.6951 1035	85
86	30.7098 5537	27.0886 9926	24.1428 1842	21.7178 0895	86
87	30.7862 6735	27.1388 3986	24.1757 8694	21.7395 3009	87
88	30.8604 5374	27.1872 8489	24.2074 8745	21.7603 1588	88
89	30.9324 7936	27.2340 9168	24.2379 6870	21.7802 0658	89
90	31.0024 0714	27.2793 1564	24.2672 7759	21.7992 4075	90
91	31.0702 9820	27.3230 1028	24.2954 5923	21.8174 5526	91
92	31.1362 1184	27.3652 2732	24.3225 5695	21.8348 8542	92
93	31.2002 0567	27.4060 1673	24.3486 1245	21.8515 6499	93
94	31.2623 3560	27.4454 2680	24.3736 6582	21.8675 2631	94
95	31.3226 5592	27.4835 0415	24.3977 5559	21.8828 0030	95
96	31.3812 1934	27.5202 9387	24.4209 1884	21.8974 1655	96
97	31.4380 7703	27.5558 3948	24.4431 9119	21.9114 0340	97
98	31.4932 7867	27.5901 8308	24.4646 0692	21.9247 8794	98
99	31.5468 7250	27.6233 6529	24.4851 9896	21.9375 9612	99
100	31.5989 0534	27.6554 2540	24.5049 9900	21.9498 5274	100

Present Value of 1 per Annum at Compound Interest

$$a_{\overline{n|}} = (1-v^n)/i$$

n	5%	5½%	6%	6½%	n
1	0.9523 8095	0.9478 6730	0.9433 9623	0.9389 6714	1
2	1.8594 1043	1.8463 1971	1.8333 9267	1.8206 2642	2
3	2.7232 4803	2.6979 3338	2.6730 1195	2.6484 7551	3
4	3.5459 5050	3.5051 5012	3.4651 0561	3.4257 9860	4
5	4.3294 7667	4.2702 8448	4.2123 6379	4.1556 7944	5
6	5.0756 9206	4.9955 3031	4.9173 2433	4.8410 1356	6
7	5.7863 7340	5.6829 6712	5.5823 8144	5.4845 1977	7
8	6.4632 1276	6.3345 6599	6.2097 9381	6.0887 5096	8
9	7.1078 2168	6.9521 9525	6.8016 9227	6.6561 0419	9
10	7.7217 3493	7.5376 2583	7.3600 8705	7.1888 3022	10
11	8.3064 1422	8.0925 3633	7.8868 7458	7.6890 4246	11
12	8.8632 5164	8.6185 1785	8.3838 4394	8.1587 2532	12
13	9.3935 7299	9.1170 7853	8.8526 8296	8.5997 4208	13
14	9.8986 4094	9.5896 4790	9.2949 8393	9.0138 4233	14
15	10.3796 5804	10.0375 8094	9.7122 4899	9.4026 6885	15
16	10.8377 6956	10.4621 6203	10.1058 9527	9.7677 6418	16
17	11.2740 6625	10.8646 0856	10.4772 5969	10.1105 7670	17
18	11.6895 8690	11.2460 7447	10.8276 0348	10.4324 6638	18
19	12.0853 2086	11.6076 5352	11.1581 1649	10.7347 1022	19
20	12.4622 1034	11.9503 8249	11.4699 2122	11.0185 0725	20
21	12.8211 5271	12.2752 4406	11.7640 7662	11.2849 8333	21
22	13.1630 0258	12.5831 6973	12.0415 8172	11.5351 9562	22
23	13.4885 7388	12.8750 4240	12.3033 7898	11.7701 3673	23
24	13.7986 4179	13.1516 9895	12.5503 5753	11.9907 3871	24
25	14.0939 4457	13.4139 3266	12.7833 5616	12.1978 7672	25
26	14.3751 8530	13.6624 9541	13.0031 6619	12.3923 7251	26
27	14.6430 3362	13.8980 9991	13.2105 3414	12.5749 9766	27
28	14.8981 2726	14.1214 2172	13.4061 6428	12.7464 7668	28
29	15.1410 7358	14.3331 0116	13.5907 2102	12.9074 8984	29
30	15.3724 5103	14.5337 4517	13.7648 3115	13.0586 7591	30
31	15.5928 1050	14.7239 2907	13.9290 8599	13.2006 3465	31
32	15.8026 7667	14.9041 9817	14.0840 4339	13.3339 2925	32
33	16.0025 4921	15.0750 6936	14.2302 2961	13.4590 8850	33
34	16.1929 0401	15.2370 3257	14.3681 4114	13.5766 0892	34
35	16.3741 9429	15.3905 5220	14.4982 4636	13.6869 5673	35
36	16.5468 5171	15.5360 6843	14.6209 8713	13.7905 6970	36
37	16.7112 8734	15.6739 9851	14.7367 8031	13.8878 5887	37
38	16.8678 9271	15.8047 3793	14.8460 1916	13.9792 1021	38
39	17.0170 4067	15.9286 6154	14.9490 7468	14.0649 8611	39
40	17.1590 8635	16.0461 2469	15.0462 9687	14.1455 2687	40
41	17.2943 6796	16.1574 6416	15.1380 1592	14.2211 5199	41
42	17.4232 0758	16.2629 9920	15.2245 4332	14.2921 6149	42
43	17.5459 1198	16.3630 3242	15.3061 7294	14.3588 3708	43
44	17.6627 7331	16.4578 5063	15.3831 8202	14.4214 4327	44
45	17.7740 6982	16.5477 2572	15.4558 3209	14.4802 2842	45
46	17.8800 6650	16.6329 1537	15.5243 6990	14.6354 2575	46
47	17.9810 1571	16.7136 6386	15.5890 2821	14.5872 5422	47
48	18.0771 5782	16.7902 0271	15.6500 2661	14.6359 1946	48
49	18.1687 2173	16.8627 5139	15.7075 7227	14.6816 1451	49
50	18.2559 2546	16.9315 1790	15.7618 6064	14.7245 2067	50

Present Value of 1 Per Annum at Compound Interest

$$a_{\overline{n}|} = (1 - v^n)/i$$

n	5%	5½%	6%	6½%	n
51	18.3389 7663	16.9966 9943	15.8130 7607	14.7648 0814	51
52	18.4180 7298	17.0584 8287	15.8613 9252	14.8026 3675	52
53	18.4934 0284	17.1170 4538	15.9069 7408	14.8381 5658	53
54	18.5651 4556	17.1725 5486	15.9499 7554	14.8715 0852	54
55	18.6334 7196	17.2251 7048	15.9905 4297	14.9028 2490	55
56	18.6985 4473	17.2750 4311	16.0288 1412	14.9322 2996	56
57	18.7605 1879	17.3223 1575	16.0649 1898	14.9598 4033	57
58	18.8195 4170	17.3671 2393	16.0989 8017	14.9857 6557	58
59	18.8757 5400	17.4095 9614	16.1311 1337	15.0101 0852	59
60	18.9292 8952	17.4498 5416	16.1614 2771	15.0329 6574	60
61	18.9802 7574	17.4880 1343	16.1900 2614	15.0544 2793	61
62	19.0288 3404	17.5241 8334	16.2170 0579	15.0745 8021	62
63	19.0750 8003	17.5584 6762	16.2424 5829	15.0935 0255	63
64	19.1191 2384	17.5909 6457	16.2664 7009	15.1112 7000	64
65	19.1610 7033	17.6217 6737	16.2891 2272	15.1279 5305	65
66	19.2010 1936	17.6509 6433	16.3104 9314	15.1436 1789	66
67	19.2390 6606	17.6786 3917	16.3306 5390	15.1583 2666	67
68	19.2753 0101	17.7048 7125	16.3496 7349	15.1721 3770	68
69	19.3098 1048	17.7297 3579	16.3676 1650	15.1851 0583	69
70	19.3426 7665	17.7533 0406	16.3845 4387	15.1972 8247	70
71	19.3739 7776	17.7756 4366	16.4005 1308	15.2087 1593	71
72	19.4037 8834	17.7968 1864	16.4155 7838	15.2194 5158	72
73	19.4321 7937	17.8168 8970	16.4297 9093	15.2295 3200	73
74	19.4592 1845	17.8359 1441	16.4431 9899	15.2389 9718	74
75	19.4849 6995	17.8539 4731	16.4558 4810	15.2478 8468	75
76	19.5094 9519	17.8710 4010	16.4677 8123	15.2562 2974	76
77	19.5328 5257	17.8872 4180	16.4790 3889	15.2640 6549	77
78	19.5550 9768	17.9025 9887	16.4896 5933	15.2714 2299	78
79	19.5762 8351	17.9171 5532	16.4996 7862	15.2783 3145	79
80	19.5964 6048	17.9309 5291	16.5091 3077	15.2848 1826	80
81	19.6156 7665	17.9440 3120	16.5180 4790	15.2909 0917	81
82	19.6339 7776	17.9564 2768	16.5264 6028	15.2966 2832	82
83	19.6514 0739	17.9681 7789	16.5343 9649	15.3019 9843	83
84	19.6680 0704	17.9793 1554	16.5418 8348	15.3070 4078	84
85	19.6838 1623	17.9898 7255	16.5489 4668	15.3117 7538	85
86	19.6988 7260	17.9998 7919	16.5556 1008	15.3162 2101	86
87	19.7132 1200	18.0093 6416	16.5618 9630	15.3203 9531	87
88	19.7268 6857	18.0183 5466	16.5678 2670	15.3243 1485	88
89	19.7398 7483	18.0268 7645	16.5734 2141	15.3279 9516	89
90	19.7522 6174	18.0349 5398	16.5786 9944	15.3314 5086	90
91	19.7640 5880	18.0426 1041	16.5836 7872	15.3346 9564	91
92	19.7752 9410	18.0498 6769	16.5883 7615	15.3377 4239	92
93	19.7859 9438	18.0567 4662	16.5928 0769	15.3406 0318	93
94	19.7961 8512	18.0632 6694	16.5969 8839	15.3432 8937	94
95	19.8058 9059	18.0694 4734	16.6009 3244	15.3458 1161	95
96	19.8151 3390	18.0753 0553	16.6046 5325	15.3481 7992	96
97	19.8239 3705	18.0808 5833	16.6081 6344	15.3504 0368	97
98	19.8323 2100	18.0861 2164	16.6114 7494	15.3524 9172	98
99	19.8403 0571	18.0911 1055	16.6145 9900	15.3544 5232	99
100	19.8479 1020	18.0958 3939	16.6175 4623	15.3562 9326	100

Present Value of 1 per Annum at Compound Interest

$$a_{\overline{n}|} = (1 - v^n)/i$$

n	7%	7½%	8%	8½%	n
1	0.9345 7944	0.9302 3256	0.9259 2593	0.9216 5899	1
2	1.8080 1817	1.7955 6517	1.7832 6475	1.7711 1427	2
3	2.6243 1604	2.6005 2574	2.5770 9699	2.5540 2237	3
4	3.3872 1126	3.3493 2627	3.3121 2684	3.2755 9666	4
5	4.1001 9744	4.0458 8490	3.9927 1004	3.9406 4208	5
6	4.7665 3966	4.6938 4642	4.6228 7966	4.5535 8717	6
7	5.3892 8940	5.2966 0132	5.2063 7006	5.1185 1352	7
8	5.9712 9851	5.8573 0355	5.7466 3894	5.6391 8297	8
9	6.5152 3225	6.3788 8703	6.2468 8791	6.1190 6264	9
10	7.0235 8154	6.8640 8096	6.7100 8140	6.5613 4806	10
11	7.4986 7434	7.3154 2415	7.1389 6426	6.9689 8439	11
12	7.9426 8630	7.7352 7827	7.5360 7802	7.3446 8607	12
13	8.3576 5074	8.1258 4026	7.9037 7594	7.6909 5490	13
14	8.7454 6799	8.4891 5373	8.2442 3698	8.0100 9668	14
15	9.1079 1401	8.8271 1974	8.5594 7869	8.3042 3658	15
16	9.4466 4860	9.1415 0674	8.8513 6916	8.5753 3325	16
17	9.7632 2299	9.4339 5976	9.1216 3811	8.8251 9194	17
18	10.0590 8691	9.7060 0908	9.3718 8714	9.0554 7644	18
19	10.3355 9524	9.9590 7821	9.6035 9920	9.2677 2022	19
20	10.5940 1425	10.1944 9136	9.8181 4741	9.4633 3661	20
21	10.8355 2733	10.4134 8033	10.0168 0316	9.6436 2821	21
22	11.0612 4050	10.6171 9101	10.2007 4366	9.8097 9559	22
23	11.2721 8738	10.8066 8931	10.3710 5895	9.9629 4524	23
24	11.4693 3400	10.9829 6680	10.5287 5828	10.1040 9700	24
25	11.6535 8318	11.1469 4586	10.6747 7619	10.2341 9078	25
26	11.8257 7867	11.2994 8452	10.8099 7795	10.3540 9288	26
27	11.9867 0904	11.4413 8095	10.9351 6477	10.4646 0174	27
28	12.1371 1125	11.5733 7763	11.0510 7849	10.5664 5321	28
29	12.2776 7407	11.6961 6524	11.1584 0601	10.6603 2554	29
30	12.4090 4118	11.8103 8627	11.2577 8334	10.7468 4382	30
31	12.5318 1419	11.9166 3839	11.3497 9939	10.8265 8416	31
32	12.6465 5532	12.0154 7757	11.4349 9944	10.9000 7757	32
33	12.7537 9002	12.1074 2099	11.5138 8837	10.9678 1343	33
34	12.8540 0936	12.1929 4976	11.5869 3367	11.0302 4279	34
35	12.9476 7230	12.2725 1141	11.6545 6822	11.0877 8137	35
36	13.0352 0776	12.3465 2224	11.7171 9279	11.1408 1233	36
37	13.1170 1660	12.4153 6953	11.7751 7851	11.1896 8878	37
38	13.1934 7345	12.4794 1351	11.8288 6899	11.2347 3620	38
39	13.2649 2846	12.5389 8931	11.8785 8240	11.2762 5457	39
40	13.3317 0884	12.5944 0866	11.9246 1333	11.3145 2034	40
41	13.3941 2041	12.6459 6155	11.9672 3457	11.3497 8833	41
42	13.4524 4898	12.6939 1772	12.0066 9867	11.3822 9339	42
43	13.5069 6167	12.7385 2811	12.0432 3951	11.4122 5197	43
44	13.5579 0810	12.7800 2615	12.0770 7362	11.4398 6357	44
45	13.6055 2159	12.8186 2898	12.1084 0150	11.4653 1205	45
46	13.6500 2018	12.8545 3858	12.1374 0880	11.4887 6686	46
47	13.6916 0764	12.8879 4287	12.1642 6741	11.5103 8420	47
48	13.7304 7443	12.9190 1662	12.1891 3649	11.5303 0802	48
49	13.7667 9853	12.9479 2244	12.2121 6341	11.5486 7099	49
50	13.8007 4629	12.9748 1157	12.2334 8464	11.5655 9538	50

Present Value of 1 per Annum at Compound Interest

$$a_{\overline{n}|} = (1 - v^n)/i$$

n	7%	7½%	8%	8½%	n
51	13.8324 7317	12.9998 2472	12.2532 2652	11.5811 9390	51
52	13.8621 2446	13.0230 9276	12.2715 0604	11.5955 7041	52
53	13.8898 3594	13.0447 3745	12.2884 3152	11.6088 2066	53
54	13.9157 3453	13.0648 7205	12.3041 0326	11.6210 3287	54
55	13.9399 3881	13.0836 0191	12.3186 1413	11.6322 8835	55
56	13.9625 5964	13.1010 2503	12.3320 5012	11.6426 6208	56
57	13.9837 0059	13.1172 3258	12.3444 9085	11.6522 2311	57
58	14.0034 5850	13.1323 0938	12.3560 1005	11.6610 3513	58
59	14.0219 2383	13.1463 3431	12.3666 7597	11.6691 5680	59
60	14.0391 8115	13.1593 8075	12.3765 5182	11.6766 4221	60
61	14.0553 0949	13.1715 1698	12.3856 9613	11.6835 4121	61
62	14.0703 8270	13.1828 0649	12.3941 6309	11.6898 9973	62
63	14.0844 6981	13.1933 0836	12.4020 0286	11.6957 6012	63
64	14.0976 3534	13.2030 7755	12.4092 6190	11.7011 6140	64
65	14.1099 3957	13 2121 6516	12.4159 8324	11.7061 3954	65
66	14.1214 3885	13.2206 1875	12.4222 0671	11.7107 2769	66
67	14.1321 8584	13.2284 8256	12.4279 6917	11.7149 5639	67
68	14.1422 2976	13.2357 9773	12.4333 0479	11.7188 5382	68
69	14.1516 1660	13.2426 0254	12.4382 4518	11.7224 4592	69
70	14.1603 8934	13.2489 3260	12.4428 1961	11.7257 5661	70
71	14.1685 8817	13.2548 2102	12.4470 5519	11.7288 0793	71
72	14.1762 5063	13.2602 9862	12.4509 7703	11.7316 2021	72
73	14.1834 1180	13.2653 9407	12.4546 0836	11.7342 1218	73
74	14.1901 0449	13.2701 3402	12.4579 7071	11.7366 0109	74
75	14.1963 5933	13.2745 4327	12.4610 8399	11.7388 0284	75
76	14.2022 0498	13.2786 4490	12.4639 6665	11.7408 3211	76
77	14.2076 6821	13.2824 6038	12.4666 3579	11.7427 0241	77
78	14.2127 7403	13.2860 0965	12.4691 0721	11.7444 2618	78
79	14.2175 4582	13.2893 1130	12.4713 9557	11.7460 1492	79
80	14.2220 0544	13.2923 8261	12.4735 1441	11.7474 7919	80
81	14.2261 7331	13.2952 3964	12.4754 7631	11.7488 2874	81
82	14.2300 6851	13.2978 9734	12.4772 9288	11.7500 7257	82
83	14.2337 0889	13.3003 6962	12.4789 7489	11.7512 1896	83
84	14.2371 1111	13.3026 6941	12.4805 3230	11.7522 7554	84
85	14.2402 9076	13.3048 0875	12.4819 7436	11.7532 4935	85
86	14.2432 6239	13.3067 9884	12.4833 0959	11.7541 4686	86
87	14.2460 3962	13.3086 5008	12.4845 4592	11.7549 7407	87
88	14.2486 3516	13.3103 7217	12.4856 9066	11.7557 3647	88
89	14.2510 6089	13.3119 7411	12.4867 5061	11.7564 3914	89
90	14.2533 2794	13.3134 6429	12.4877 3205	11.7570 8677	90
91	14.2554 4667	13.3148 5050	12.4886 4079	11.7576 8365	91
92	14.2574 2680	13.3161 4000	12.4894 8221	11.7582 3378	92
93	14.2592 7738	13.3173 3954	12.4902 6131	11.7587 4081	93
94	14.2610 0690	13.3184 5538	12.4909 8269	11.7592 0812	94
95	14.2626 2327	13.3194 9338	12.4916 5064	11.7596 3882	95
96	14.2641 3390	13.3204 5896	12.4922 6911	11.7600 3578	96
97	14.2655 4570	13.3213 5717	12.4928 4177	11.7604 0164	97
98	14.2668 6514	13.3221 9272	12.4933 7201	11.7607 3884	98
99	14.2680 9826	13.3229 6997	12.4938 6297	11.7610 4962	99
100	14.2692 5071	13.3236 9290	12.4943 1757	11.7613 3606	100

Annuity Whose Amount at Compound Interest is 1

$$s_{\overline{n}|}^{-1}=i/[(1+i)^n-1]$$

n	$\frac{1}{4}\%$	$\frac{7}{24}\%$	$\frac{1}{3}\%$	$\frac{5}{12}\%$	n
1	1.0000 0000	1.0000 0000	1.0000 0000	1.0000 0000	1
2	0.4993 7578	0.4992 7190	0.4991 6806	0.4989 6050	2
3	0.3325 0139	0.3323 6300	0.3322 2469	0.3319 4829	3
4	0.2490 6445	0.2489 0890	0.2487 5347	0.2484 4291	4
5	0.1990 0250	0.1988 3673	0.1986 7111	0.1983 4026	5
6	0.1656 2803	0.1654 5552	0.1652 8317	0.1649 3898	6
7	0.1417 8928	0.1416 1200	0.1444 3491	0.1410 8133	7
8	0.1239 1035	0.1237 2953	0.1235 4895	0.1231 8845	8
9	0.1100 0462	0.1098 2111	0.1096 3785	0.1092 7209	9
10	0.0988 8015	0.0986 9451	0.0985 0915	0.0981 3929	10
11	0.0897 7840	0.0895 9106	0.0894 0403	0.0890 3090	11
12	0.0821 9370	0.0820 0496	0.0818 1657	0.0814 4082	12
13	0.0757 7595	0.0755 8607	0.0753 9656	0.0750 1866	13
14	0.0702 7510	0.0700 8426	0.0698 9383	0.0695 1416	14
15	0.0655 0777	0.0653 1613	0.0651 2491	0.0647 4378	15
16	0.0613 3642	0.0611 4409	0.0609 5224	0.0605 6988	16
17	0.0576 5587	0.0574 6297	0.0572 7056	0.0568 8720	17
18	0.0543 8433	0.0541 9094	0.0539 9807	0.0536 1387	18
19	0.0514 5722	0.0512 6341	0.0510 7015	0.0506 8525	19
20	0.0488 2288	0.0486 2870	0.0484 3511	0.0480 4963	20
21	0.0464 3947	0.0462 4499	0.0460 5112	0.0456 6517	21
22	0.0442 7278	0.0440 7804	0.0438 8393	0.0434 9760	22
23	0.0422 9455	0.0420 9958	0.0419 0528	0.0415 1865	23
24	0.0404 8121	0.0402 8606	0.0400 9159	0.0397 0472	24
25	0.0388 1298	0.0386 1767	0.0384 2307	0.0380 3603	25
26	0.0372 7312	0.0370 7767	0.0368 8297	0.0364 9581	26
27	0.0358 4736	0.0356 5180	0.0354 5702	0.0350 6978	27
28	0.0345 2347	0.0343 2783	0.0341 3299	0.0337 4572	28
29	0.0332 9093	0.0330 9521	0.0329 0034	0.0325 1307	29
30	0.0321 4059	0.0319 4482	0.0317 4992	0.0313 6270	30
31	0.0310 6449	0.0308 6869	0.0306 7379	0.0302 8663	31
32	0.0300 5569	0.0298 5987	0.0296 6497	0.0292 7791	32
33	0.0291 0806	0.0289 1222	0.0287 1734	0.0283 3041	33
34	0.0282 1620	0.0280 2037	0.0278 2552	0.0274 3873	34
35	0.0273 7533	0.0271 7951	0.0269 8470	0.0265 9809	35
36	0.0265 8121	0.0263 8541	0.0261 9066	0.0258 0423	36
37	0.0258 3004	0.0256 3428	0.0254 3958	0.0250 5336	37
38	0.0251 1843	0.0249 2271	0.0247 2808	0.0243 4208	38
39	0.0244 4335	0.0242 4767	0.0240 5311	0.0236 6736	39
40	0.0238 0204	0.0236 0642	0.0234 1194	0.0230 2644	40
41	0.0231 9204	0.0229 9648	0.0228 0210	0.0224 1685	41
42	0.0226 1112	0.0224 1562	0.0222 2133	0.0218 3637	42
43	0.0220 5724	0.0218 6181	0.0216 6762	0.0212 8295	43
44	0.0215 2855	0.0213 3321	0.0211 3913	0.0207 5474	44
45	0.0210 2339	0.0208 2813	0.0206 3416	0.0202 5008	45
46	0.0205 4022	0.0203 4504	0.0201 5118	0.0197 6743	46
47	0.0200 7762	0.0198 8254	0.0196 8880	0.0193 0537	47
48	0.0196 3433	0.0194 3933	0.0192 4572	0.0188 6263	48
49	0.0192 0915	0.0190 1425	0.0188 2077	0.0184 3801	49
50	0.0188 0099	0.0186 0620	0.0184 1285	0.0180 3044	50

Annuity Whose Amount at Compound Interest is 1

$$s_{\overline{n}|}^{-1} = i/[(1+i)^n - 1]$$

n	$\frac{1}{4}\%$	$\frac{7}{24}\%$	$\frac{1}{3}\%$	$\frac{5}{12}\%$	n
51	0.0184 0886	0.0182 1418	0.0180 2096	0.0176 3891	51
52	0.0180 3184	0.0178 3726	0.0176 4418	0.0172 6249	52
53	0.0176 6906	0.0174 7460	0.0172 8168	0.0169 0033	53
54	0.0173 1974	0.0171 2539	0.0169 3259	0.0165 5164	54
55	0.0169 8314	0.0167 8890	0.0165 9625	0.0162 1567	55
56	0.0166 5858	0.0164 6446	0.0162 7196	0.0158 9176	56
57	0.0163 4542	0.0161 5143	0.0159 5908	0.0155 7927	57
58	0.0160 4308	0.0158 4921	0.0156 5702	0.0152 7760	58
59	0.0157 5101	0.0155 5727	0.0153 6523	0.0149 8620	59
60	0.0154 6869	0.0152 7508	0.0150 8319	0.0147 0457	60
61	0.0151 9564	0.0150 0216	0.0148 1044	0.0144 3221	61
62	0.0149 3142	0.0147 3807	0.0145 4651	0.0141 6869	62
63	0.0146 7561	0.0144 8239	0.0142 9099	0.0139 1358	63
64	0.0144 2780	0.0142 3472	0.0140 4348	0.0136 6649	64
65	0.0141 8764	0.0139 9469	0.0138 0362	0.0134 2704	65
66	0.0139 5476	0.0137 6196	0.0135 7105	0.0131 9489	66
67	0.0137 2886	0.0135 3619	0.0133 4545	0.0129 6972	67
68	0.0135 0961	0.0133 1709	0.0131 2652	0.0127 5121	68
69	0.0132 9674	0.0131 0436	0.0129 1396	0.0125 3908	69
70	0.0130 8996	0.0128 9772	0.0127 0750	0.0123 3304	70
71	0.0128 8902	0.0126 9693	0.0125 0688	0.0121 3285	71
72	0.0126 9368	0.0125 0173	0.0123 1185	0.0119 3827	72
73	0.0125 0370	0.0123 1190	0.0121 2220	0.0117 4905	73
74	0.0123 1887	0.0121 2722	0.0119 3770	0.0115 6498	74
75	0.0121 3898	0.0119 4748	0.0117 5814	0.0113 8586	75
76	0.0119 6385	0.0117 7250	0.0115 8333	0.0112 1150	76
77	0.0117 9327	0.0116 0207	0.0114 1308	0.0110 4170	77
78	0.0116 2708	0.0114 3603	0.0112 4723	0.0108 7629	78
79	0.0114 6511	0.0112 7422	0.0110 8559	0.0107 1510	79
80	0.0113 0721	0.0111 1647	0.0109 2802	0.0105 5798	80
81	0.0111 5321	0.0109 6263	0.0107 7437	0.0104 0477	81
82	0.0110 0298	0.0108 1256	0.0106 2448	0.0102 5534	82
83	0.0108 5639	0.0106 6612	0.0104 7823	0.0101 0954	83
84	0.0107 1330	0.0105 2318	0.0103 3548	0.0099 6724	84
85	0.0105 7359	0.0103 8363	0.0101 9611	0.0098 2833	85
86	0.0104 3714	0.0102 4734	0.0100 6000	0.0096 9268	86
87	0.0103 0384	0.0101 1419	0.0099 2705	0.0095 6018	87
88	0.0101 7357	0.0099 8409	0.0097 9713	0.0094 3073	88
89	0.0100 4625	0.0098 5693	0.0096 7016	0.0093 0422	89
90	0.0099 2177	0.0097 3261	0.0095 4603	0.0091 8055	90
91	0.0098 0004	0.0096 1104	0.0094 2464	0.0090 5962	91
92	0.0096 8096	0.0094 9212	0.0093 0592	0.0089 4136	92
93	0.0095 6446	0.0093 7578	0.0091 8977	0.0088 2568	93
94	0.0094 5044	0.0092 6193	0.0090 7611	0.0087 1248	94
95	0.0093 3884	0.0091 5049	0.0089 6486	0.0086 0170	95
96	0.0092 2957	0.0090 4139	0.0088 5595	0.0084 9325	96
97	0.0091 2257	0.0089 3455	0.0087 4930	0.0083 8707	97
98	0.0090 1776	0.0088 2990	0.0086 4485	0.0082 8309	98
99	0.0089 1508	0.0087 2738	0.0085 4252	0.0081 8124	99
100	0.0088 1446	0.0086 2693	0.0084 4226	0.0080 8145	100

Annuity Whose Amount at Compound Interest is 1

$$s_{\overline{n|}}^{-1} = i/[(1+i)^n - 1]$$

n	$\frac{1}{4}\%$	$\frac{7}{24}\%$	$\frac{1}{3}\%$	$\frac{5}{12}\%$	n
101	0.0087 1584	0.0085 2848	0.0083 4400	0.0079 8366	101
102	0.0086 1917	0.0084 3198	0.0082 4769	0.0078 8782	102
103	0.0085 2439	0.0083 3736	0.0081 5327	0.0077 9387	103
104	0.0084 3144	0.0082 4457	0.0080 6068	0.0077 0175	104
105	0.0083 4027	0.0081 5357	0.0079 6987	0.0076 1142	105
106	0.0082 5083	0.0080 6430	0.0078 8079	0.0075 2281	106
107	0.0081 6307	0.0079 7670	0.0077 9340	0.0074 3589	107
108	0.0080 7694	0.0078 9075	0.0077 0764	0.0073 5061	108
109	0.0079 9241	0.0078 0638	0.0076 2346	0.0072 6691	109
110	0.0079 0942	0.0077 2356	0.0075 4084	0.0071 8476	110
111	0.0078 2793	0.0076 4225	0.0074 5972	0.0071 0412	111
112	0.0077 4791	0.0075 6240	0.0073 8007	0.0070 2495	112
113	0.0076 6932	0.0074 8397	0.0073 0184	0.0069 4719	113
114	0.0075 9211	0.0074 0693	0.0072 2500	0.0068 7083	114
115	0.0075 1625	0.0073 3125	0.0071 4952	0.0067 9582	115
116	0.0074 4172	0.0072 5688	0.0070 7535	0.0067 2213	116
117	0.0073 6846	0.0071 8380	0.0070 0246	0.0066 4973	117
118	0.0072 9646	0.0071 1196	0.0069 3082	0.0065 7857	118
119	0.0072 2567	0.0070 4135	0.0068 6041	0.0065 0863	119
120	0.0071 5608	0.0069 7192	0.0067 9118	0.0064 3988	120
121	0.0070 8764	0.0069 0365	0.0067 2311	0.0063 7230	121
122	0.0070 2033	0.0068 3652	0.0066 5617	0.0063 0584	122
123	0.0069 5412	0.0067 7048	0 0065 9034	0.0062 4049	123
124	0.0068 8899	0.0067 0552	0.0065 2558	0.0061 7621	124
125	0.0068 2491	0.0066 4162	0.0064 6188	0.0061 1298	125
126	0.0067 6186	0.0065 7874	0.0063 9919	0.0060 5078	126
127	0.0066 9981	0.0065 1686	0.0063 3751	0.0059 8959	127
128	0.0066 3873	0.0064 5595	0.0062 7681	0.0059 2937	128
129	0.0065 7861	0.0063 9601	0.0062 1707	0.0058 7010	129
130	0.0065 1942	0.0063 3699	0.0061 5825	0.0058 1177	130
131	0.0064 6115	0.0062 7889	0.0061 0035	0.0057 5435	131
132	0.0064 0376	0.0062 2168	0.0060 4334	0.0056 9782	132
133	0.0063 4725	0.0061 6534	0.0059 8720	0.0056 4216	133
134	0.0062 9159	0.0061 0985	0.0059 3191	0.0055 8736	134
135	0.0062 3675	0.0060 5519	0.0058 7745	0.0055 3339	135
136	0.0061 8274	0.0060 0135	0.0058 2381	0.0054 8023	136
137	0.0061 2952	0.0059 4830	0.0057 7097	0.0054 2787	137
138	0.0060 7707	0.0058 9603	0.0057 1890	0.0053 7628	138
139	0.0060 2539	0.0058 4453	0.0056 6760	0.0053 2546	139
140	0.0059 7446	0.0057 9377	0.0056 1704	0.0052 7539	140
141	0.0059 2425	0.0057 4373	0.0055 6721	0.0052 2604	141
142	0.0058 7476	0.0056 9442	0.0055 1809	0.0051 7741	142
143	0.0058 2597	0.0056 4580	0.0054 6968	0.0051 2948	143
144	0.0057 7787	0.0055 9787	0.0054 2195	0.0050 8224	144
145	0.0057 3043	0.0055 5061	0.0053 7489	0.0050 3566	145
146	0.0056 8365	0.0055 0401	0.0053 2849	0.0049 8975	146
147	0.0056 3752	0.0054 5805	0.0052 8273	0.0049 4447	147
148	0.0055 9201	0.0054 1272	0.0052 3760	0.0048 9983	148
149	0.0055 4712	0.0053 6800	0.0051 9309	0.0048 5580	149
150	0.0055 0284	0.0053 2390	0.0051 4919	0.0048 1238	150

Annuity Whose Amount at Compound Interest is 1

$$s^{-1}_{\overline{n}|}=i/[(1+i)^n-1]$$

n	$\frac{1}{4}\%$	$\frac{7}{24}\%$	$\frac{1}{3}\%$	$\frac{5}{12}\%$	n
151	0.0054 5915	0.0052 8038	0.0051 0588	0.0047 6956	151
152	0.0054 1605	0.0052 3745	0.0050 6315	0.0047 2731	152
153	0.0053 7351	0.0051 9509	0.0050 2099	0.0046 8564	153
154	0.0053 3153	0.0051 5329	0.0049 7939	0.0046 4453	154
155	0.0052 9010	0.0051 1203	0.0049 3834	0.0046 0396	155
156	0.0052 4921	0.0050 7132	0.0048 9783	0.0045 6393	156
157	0.0052 0885	0.0050 3113	0.0048 5784	0.0045 2443	157
158	0.0051 6900	0.0049 9146	0.0048 1837	0.0044 8545	158
159	0.0051 2966	0.0049 5230	0.0047 7941	0.0044 4697	159
160	0.0050 9082	0.0049 1363	0.0047 4095	0.0044 0899	160
161	0.0050 5246	0.0048 7545	0.0047 0298	0.0043 7150	161
162	0.0050 1459	0.0048 3776	0.0046 6549	0.0043 3450	162
163	0.0049 7719	0.0048 0053	0.0046 2846	0.0042 9796	163
164	0.0049 4025	0.0047 6377	0.0045 9190	0.0042 6188	164
165	0.0049 0377	0.0047 2746	0.0045 5580	0.0042 2626	165
166	0.0048 6773	0.0046 9160	0.0045 2014	0.0041 9109	166
167	0.0048 3213	0.0046 5617	0.0044 8492	0.0041 5635	167
168	0.0047 9695	0.0046 2118	0.0044 5012	0.0041 2204	168
169	0.0047 6220	0.0045 8660	0.0044 1575	0.0040 8815	169
170	0.0047 2787	0.0045 5244	0.0043 8180	0.0040 5468	170
171	0.0046 9394	0.0045 1869	0.0043 4825	0.0040 2162	171
172	0.0046 6042	0.0044 8534	0.0043 1510	0.0039 8896	172
173	0.0046 2728	0.0044 5239	0.0042 8235	0.0039 5669	173
174	0.0045 9454	0.0044 1982	0.0042 4998	0.0039 2481	174
175	0.0045 6217	0.0043 8763	0.0042 1800	0.0038 9330	175
176	0.0045 3018	0.0043 5581	0.0041 8639	0.0038 6217	176
177	0.0044 9855	0.0043 2436	0.0041 5514	0.0038 3141	177
178	0.0044 6729	0.0042 9327	0.0041 2426	0.0038 0101	178
179	0.0044 3638	0.0042 6254	0.0040 9373	0.0037 7097	179
180	0.0044 0582	0.0042 3215	0.0040 6355	0.0037 4127	180
181	0.0043 7560	0.0042 0212	0.0040 3371	0.0037 1192	181
182	0.0043 4572	0.0041 7242	0.0040 0421	0.0036 8290	182
183	0.0043 1617	0.0041 4305	0.0039 7504	0.0036 5422	183
184	0.0042 8695	0.0041 1400	0.0039 4620	0.0036 2586	184
185	0.0042 5805	0.0040 8528	0.0039 1768	0.0035 9782	185
186	0.0042 2947	0.0040 5687	0.0038 8948	0.0035 7010	186
187	0.0042 0120	0.0040 2878	0.0038 6159	0.0035 4269	187
188	0.0041 7323	0.0040 0099	0.0038 3400	0.0035 1559	188
189	0.0041 4557	0.0039 7350	0.0038 0672	0.0034 8879	189
190	0.0041 1820	0.0039 4631	0.0037 7973	0.0034 6228	190
191	0.0040 9112	0.0039 1941	0.0037 5304	0.0034 3607	191
192	0.0040 6434	0.0038 9280	0.0037 2663	0.0034 1014	192
193	0.0040 3783	0.0038 6647	0.0037 0050	0.0033 8450	193
194	0.0040 1160	0.0038 4042	0.0036 7466	0.0033 5913	194
195	0.0039 8565	0.0038 1465	0.0036 4908	0.0033 3404	195
196	0.0039 5997	0.0037 8914	0.0036 2378	0.0033 0922	196
197	0.0039 3455	0.0037 6390	0.0035 9874	0.0032 8467	197
198	0.0039 0939	0.0037 3892	0.0035 7397	0.0032 6037	198
199	0.0038 8450	0.0037 1420	0.0035 4945	0.0032 3634	199
200	0.0038 5985	0.0036 8974	0.0035 2519	0.0032 1255	200

Annuity Whose Amount at Compound Interest is 1

$$s^{-1}_{\overline{n}|}=i/[(1+i)^n-1]$$

n	$\frac{1}{2}\%$	$\frac{7}{12}\%$	$\frac{5}{8}\%$	$\frac{2}{3}\%$	n
1	1.0000 0000	1.0000 0000	1.0000 0000	1.0000 0000	1
2	0.4987 5312	0.4985 4591	0.4984 4237	0.4983 3887	2
3	0.3316 7221	0.3313 9643	0.3312 5865	0.3311 2095	3
4	0.2481 3279	0.2478 2310	0.2476 6842	0.2475 1384	4
5	0.1980 0997	0.1976 8024	0.1975 1558	0.1973 5105	5
6	0.1645 9546	0.1642 5260	0.1640 8143	0.1639 1042	6
7	0.1407 2854	0.1403 7653	0.1402 0082	0.1400 2531	7
8	0.1228 2886	0.1224 7018	0.1222 9118	0.1221 1240	8
9	0.1089 0736	0.1085 4365	0.1083 6218	0.1081 8096	9
10	0.0977 7057	0.0974 0299	0.0972 1962	0.0970 3654	10
11	0.0886 5903	0.0882 8842	0.0881 0358	0.0879 1905	11
12	0.0810 6643	0.0806 9341	0.0805 0742	0.0803 2176	12
13	0.0746 4224	0.0742 6730	0.0740 8039	0.0738 9385	13
14	0.0691 3609	0.0687 5962	0.0685 7198	0.0683 8474	14
15	0.0643 6436	0.0639 8666	0.0637 9845	0.0636 1067	15
16	0.0601 8937	0.0598 1068	0.0596 2202	0.0594 3382	16
17	0.0565 0579	0.0561 2632	0.0559 3732	0.0557 4879	17
18	0.0532 3173	0.0528 5165	0.0526 6239	0.0524 7363	18
19	0.0503 0253	0.0499 2198	0.0497 3252	0.0495 4360	19
20	0.0476 6645	0.0472 8556	0.0470 9597	0.0469 0695	20
21	0.0452 8163	0.0449 0050	0.0447 1083	0.0445 2176	21
22	0.0431 1380	0.0427 3251	0.0425 4281	0.0423 5374	22
23	0.0411 3465	0.0407 5329	0.0405 6360	0.0403 7456	23
24	0.0393 2061	0.0389 3925	0.0387 4959	0.0385 6062	24
25	0.0376 5186	0.0372 7055	0.0370 8096	0.0368 9209	25
26	0.0361 1163	0.0357 3043	0.0355 4094	0.0353 5219	26
27	0.0346 8565	0.0343 0460	0.0341 1523	0.0339 2664	27
28	0.0333 6167	0.0329 8082	0.0327 9159	0.0326 0316	28
29	0.0321 2914	0.0317 4853	0.0315 5946	0.0313 7122	29
30	0.0309 7892	0.0305 9857	0.0304 0969	0.0302 2165	30
31	0.0299 0304	0.0295 2299	0.0293 3430	0.0291 4649	31
32	0.0288 9453	0.0285 1482	0.0283 2633	0.0281 3875	32
33	0.0279 4727	0.0275 6791	0.0273 7964	0.0271 9231	33
34	0.0270 5586	0.0266 7687	0.0264 8883	0.0263 0176	34
35	0.0262 1550	0.0258 3691	0.0256 4911	0.0254 6231	35
36	0.0254 2194	0.0250 4376	0.0248 5622	0.0246 6970	36
37	0.0246 7139	0.0242 9365	0.0241 0636	0.0239 2013	37
38	0.0239 6045	0.0235 8316	0.0233 9614	0.0232 1020	38
39	0.0232 8607	0.0229 0925	0.0227 2250	0.0225 3687	39
40	0.0226 4552	0.0222 6917	0.0220 8271	0.0218 9739	40
41	0.0220 3631	0.0216 6046	0.0214 7429	0.0212 8928	41
42	0.0214 5622	0.0210 8087	0.0208 9499	0.0207 1030	42
43	0.0209 0320	0.0205 2836	0.0203 4278	0.0201 5842	43
44	0.0203 7541	0.0200 0110	0.0198 1583	0.0196 3180	44
45	0.0198 7117	0.0194 9740	0.0193 1243	0.0191 2874	45
46	0.0193 8894	0.0190 1571	0.0188 3106	0.0186 4772	46
47	0.0189 2733	0.0185 5465	0.0183 7032	0.0181 8732	47
48	0.0184 8503	0.0181 1291	0.0179 2890	0.0177 4625	48
49	0.0180 6087	0.0176 8932	0.0175 0563	0.0173 2334	49
50	0.0176 5376	0.0172 8278	0.0170 9943	0.0169 1749	50

Annuity Whose Amount at Compound Interest is 1

$$s^{-}_{\overline{n}|}=i/[(1+i)^n-1]$$

n	½%	7/12%	5/8%	2/3%	n
51	0.0172 6269	0.0168 9230	0 0167 0928	0.0165 2770	51
52	0.0168 8675	0.0165 1694	0 0163 3425	0.0161 5304	52
53	0.0165 2507	0.0161 5585	0 0159 7350	0.0157 9265	53
54	0.0161 7686	0.0158 0824	0 0156 2623	0.0154 4575	54
55	0.0158 4139	0.0154 7337	0 0152 9171	0.0151 1160	55
56	0.0155 1797	0.0151 5056	0 0149 6925	0.0147 8951	56
57	0.0152 0598	0.0148 3918	0.0146 5821	0.0144 7885	57
58	0.0149 0481	0.0145 3863	0.0143 5801	0.0141 7902	58
59	0.0146 1392	0.0142 4836	0.0140 6809	0.0138 8949	59
60	0.0143 3280	0.0139 6787	0.0137 8795	0.0136 0972	60
61	0.0140 6096	0.0136 9666	0.0135 1709	0.0133 3925	61
62	0.0137 9796	0.0134 3428	0.0132 5508	0.0130 7762	62
63	0.0135 4337	0.0131 8033	0.0130 0148	0.0128 2441	63
64	0.0132 9681	0.0129 3440	0.0127 5591	0.0125 7923	64
65	0.0130 5789	0.0126 9612	0.0125 1800	0.0123 4170	65
66	0.0128 2627	0.0124 6515	0.0122 8739	0.0121 1148	66
67	0.0126 0163	0.0122 4116	0.0120 6367	0.0118 8824	67
68	0.0123 8366	0.0120 2383	0.0118 4680	0.0116 7168	68
69	0.0121 7206	0.0118 1289	0.0116 3622	0.0114 6149	69
70	0.0119 6657	0.0116 0805	0.0114 3175	0.0112 5742	70
71	0.0117 6693	0.0114 0906	0.0112 3313	0.0110 5919	71
72	0.0115 7289	0.0112 1567	0.0110 4011	0.0108 6657	72
73	0.0113 8422	0.0110 2766	0.0108 5247	0.0106 7933	73
74	0.0112 0070	0.0108 4481	0.0106 6999	0.0104 9724	74
75	0.0110 2214	0.0106 6690	0.0104 9246	0.0103 2011	75
76	0.0108 4832	0.0104 9375	0.0103 1968	0.0101 4773	76
77	0.0106 7908	0.0103 2517	0.0101 5147	0.0099 7992	77
78	0.0105 1423	0.0101 6099	0.0099 8766	0.0098 1651	78
79	0.0103 5360	0.0100 0103	0.0098 2808	0.0096 5733	79
80	0.0101 9704	0.0098 4514	0.0096 7256	0.0095 0222	80
81	0.0100 4439	0.0096 9316	0.0095 2096	0.0093 5102	81
82	0.0098 9552	0.0095 4496	0.0093 7314	0.0092 0360	82
83	0.0097 5028	0.0094 0040	0.0092 2895	0.0090 5982	83
84	0.0096 0855	0.0092 5935	0.0090 8828	0.0089 1954	84
85	0.0094 7021	0.0091 2168	0.0089 5098	0.0087 8266	85
86	0.0093 3513	0.0089 8727	0.0088 1696	0.0086 4903	86
87	0.0092 0320	0.0088 5602	0.0086 8608	0.0085 1857	87
88	0.0090 7431	0.0087 2781	0.0085 5826	0.0083 9114	88
89	0.0089 4837	0.0086 0254	0.0084 3337	0.0082 6667	89
90	0.0088 2527	0.0084 8013	0.0083 1134	0.0081 4503	90
91	0.0087 0493	0.0083 6047	0.0081 9205	0.0080 2615	91
92	0.0085 8724	0.0082 4346	0.0080 7542	0.0079 0993	92
93	0.0084 7213	0.0081 2903	0.0079 6137	0.0077 9629	93
94	0.0083 5950	0.0080 1709	0.0078 4982	0.0076 8514	94
95	0.0082 4930	0.0079 0757	0.0077 4067	0.0075 7641	95
96	0.0081 4143	0.0078 0038	0.0076 3387	0.0074 7001	96
97	0.0080 3583	0.0076 9547	0.0075 2933	0.0073 6588	97
98	0.0079 3242	0.0075 9275	0.0074 2700	0.0072 6395	98
99	0.0078 3115	0.0074 9215	0.0073 2679	0.0071 6415	99
100	0.0077 3194	0.0073 9363	0.0072 2865	0.0070 6641	100

Annuity Whose Amount at Compound Interest is 1

$$s^{-1}_{\overline{n|}} = i/[(1+i)^n - 1]$$

n	½%	7/12%	5/8%	2/3%	n
101	0.0076 3473	0.0072 9711	0.0071 3251	0.0069 7069	101
102	0.0075 3947	0.0072 0254	0.0070 3832	0.0068 7690	102
103	0.0074 4611	0.0071 0986	0.0069 4602	0.0067 8501	103
104	0.0073 5457	0.0070 1901	0.0068 5555	0.0066 9495	104
105	0.0072 6481	0.0069 2994	0.0067 6687	0.0066 0668	105
106	0.0071 7679	0.0068 4261	0.0066 7992	0.0065 2013	106
107	0.0070 9045	0.0067 5696	0.0065 9465	0.0064 3527	107
108	0.0070 0575	0.0066 7294	0.0065 1102	0.0063 5205	108
109	0.0069 2264	0.0065 9052	0.0064 2897	0.0062 7042	109
110	0.0068 4107	0.0065 0962	0.0063 4848	0.0061 9033	110
111	0.0067 6102	0.0064 3028	0.0062 6950	0.0061 1175	111
112	0.0066 8242	0.0063 5237	0.0061 9198	0.0060 3464	112
113	0.0066 0526	0.0062 7590	0.0061 1588	0.0059 5895	113
114	0.0065 2948	0.0062 0081	0.0060 4118	0.0058 8465	114
115	0.0064 5506	0.0061 2708	0.0059 6783	0.0058 1171	115
116	0.0063 8195	0.0060 5466	0.0058 9579	0.0057 4008	116
117	0.0063 1013	0.0059 8353	0.0058 2504	0.0056 6974	117
118	0.0062 3956	0.0059 1365	0.0057 5555	0.0056 0065	118
119	0.0061 7021	0.0058 4499	0.0056 8727	0.0055 3278	119
120	0.0061 0205	0.0057 7751	0.0056 2018	0.0054 6609	120
121	0.0060 3505	0.0057 1120	0.0055 5425	0.0054 0057	121
122	0.0059 6918	0.0056 4602	0.0054 8945	0.0053 3618	122
123	0.0059 0441	0.0055 8194	0.0054 2575	0.0052 7289	123
124	0.0058 4072	0.0055 1894	0.0053 6314	0.0052 1067	124
125	0.0057 7808	0.0054 5700	0.0053 0157	0.0051 4951	125
126	0.0057 1647	0.0053 9607	0.0052 4102	0.0050 8937	126
127	0.0056 5586	0.0053 3615	0.0051 8148	0.0050 3024	127
128	0.0055 9623	0.0052 7721	0.0051 2292	0.0049 7208	128
129	0.0055 3755	0.0052 1922	0.0050 6531	0.0049 1488	129
130	0.0054 7981	0.0051 6216	0.0050 0864	0.0048 5861	130
131	0.0054 2298	0.0051 0602	0.0049 5288	0.0048 0325	131
132	0.0053 6704	0.0050 5077	0.0048 9800	0.0047 4878	132
133	0.0053 1197	0.0049 9639	0.0048 4400	0.0046 9518	133
134	0.0052 5775	0.0049 4286	0.0047 9086	0.0046 4244	134
135	0.0052 0436	0.0048 9016	0.0047 3854	0.0045 9052	135
136	0.0051 5179	0.0048 3828	0.0046 8703	0.0045 3942	136
137	0.0051 0002	0.0047 8719	0.0046 3633	0.0044 8911	137
138	0.0050 4902	0.0047 3688	0.0045 8640	0.0044 3959	138
139	0.0049 9879	0.0046 8733	0.0045 3723	0.0043 9082	139
140	0.0049 4930	0.0046 3853	0.0044 8881	0.0043 4280	140
141	0.0049 0055	0.0045 9046	0.0044 4111	0.0042 9551	141
142	0.0048 5250	0.0045 4311	0.0043 9414	0.0042 4893	142
143	0.0048 0516	0.0044 9645	0.0043 4786	0.0042 0305	143
144	0.0047 5850	0.0044 5048	0.0043 0226	0.0041 5786	144
145	0.0047 1252	0.0044 0518	0.0042 5734	0.0041 1333	145
146	0.0046 6719	0.0043 6053	0.0042 1307	0.0040 6947	146
147	0.0046 2250	0.0043 1653	0.0041 6944	0.0040 2624	147
148	0.0045 7844	0.0042 7316	0.0041 2645	0.0039 8364	148
149	0.0045 3500	0.0042 3040	0.0040 8407	0.0039 4166	149
150	0.0044 9217	0.0041 8825	0.0040 4230	0.0039 0029	150

Annuity Whose Amount at Compound Interest is 1

$$s^{-1}_{\overline{n|}} = i/[(1+i)^n - 1]$$

n	$\frac{1}{2}\%$	$\frac{7}{12}\%$	$\frac{5}{8}\%$	$\frac{2}{3}\%$	n
151	0.0044 4993	0.0041 4670	0.0040 0112	0.0038 5950	151
152	0.0044 0827	0.0041 0572	0.0039 6052	0.0038 1930	152
153	0.0043 6719	0.0040 6532	0.0039 2049	0.0037 7967	153
154	0.0043 2666	0.0040 2547	0.0038 8102	0.0037 4059	154
155	0.0042 8668	0.0039 8617	0.0038 4209	0.0037 0206	155
156	0.0042 4723	0.0039 4741	0.0038 0370	0.0036 6407	156
157	0.0042 0832	0.0039 0917	0.0037 6584	0.0036 2661	157
158	0.0041 6992	0.0038 7146	0.0037 2850	0.0035 8966	158
159	0.0041 3203	0.0038 3425	0.0036 9166	0.0035 5321	159
160	0.0040 9464	0.0037 9753	0.0036 5532	0.0035 1727	160
161	0.0040 5774	0.0037 6131	0.0036 1947	0.0034 8181	161
162	0.0040 2131	0.0037 2556	0.0035 8410	0.0034 4682	162
163	0.0039 8536	0.0036 9029	0.0035 4919	0.0034 1232	163
164	0.0039 4987	0.0036 5547	0.0035 1475	0.0033 7827	164
165	0.0039 1483	0.0036 2111	0.0034 8076	0.0033 4467	165
166	0.0038 8024	0.0035 8720	0.0034 4722	0.0033 1152	166
167	0.0038 4608	0.0035 5372	0.0034 1411	0.0032 7880	167
168	0.0038 1236	0.0035 2067	0.0033 8143	0.0032 4651	168
169	0.0037 7906	0.0034 8804	0.0033 4918	0.0032 1465	169
170	0.0037 4617	0.0034 5583	0.0033 1733	0.0031 8319	170
171	0.0037 1369	0.0034 2403	0.0032 8589	0.0031 5215	171
172	0.0036 8161	0.0033 9262	0.0032 5486	0.0031 2150	172
173	0.0036 4992	0.0033 6160	0.0032 2421	0.0030 9124	173
174	0.0036 1862	0.0033 3098	0.0031 9395	0.0030 6137	174
175	0.0035 8770	0.0033 0073	0.0031 6407	0.0030 3187	175
176	0.0035 5715	0.0032 7085	0.0031 3456	0.0030 0275	176
177	0.0035 2697	0.0032 4134	0.0031 0542	0.0029 7399	177
178	0.0034 9715	0.0032 1219	0.0030 7664	0.0029 4560	178
179	0.0034 6769	0.0031 8340	0.0030 4821	0.0029 1755	179
180	0.0034 3857	0.0031 5495	0.0030 2012	0.0028 8985	180
181	0.0034 0979	0.0031 2684	0.0029 9238	0.0028 6250	181
182	0.0033 8136	0.0030 9908	0.0029 6498	0.0028 3548	182
183	0.0033 5325	0.0030 7164	0.0029 3791	0.0028 0879	183
184	0.0033 2547	0.0030 4453	0.0029 1116	0.0027 8242	184
185	0.0032 9802	0.0030 1774	0.0028 8473	0.0027 5638	185
186	0.0032 7087	0.0029 9126	0.0028 5862	0.0027 3065	186
187	0.0032 4404	0.0029 6509	0.0028 3282	0.0027 0523	187
188	0.0032 1752	0.0029 3923	0.0028 0732	0.0026 8011	188
189	0.0031 9129	0.0029 1367	0.0027 8212	0.0026 5529	189
190	0.0031 6537	0.0028 8841	0.0027 5722	0.0026 3077	190
191	0.0031 3973	0.0028 6343	0.0027 3260	0.0026 0653	191
192	0.0031 1438	0.0028 3875	0.0027 0828	0.0025 8258	192
193	0.0030 8931	0.0028 1434	0.0026 8423	0.0025 5892	193
194	0.0030 6452	0.0027 9021	0.0026 6064	0.0025 3552	194
195	0.0030 4000	0.0027 6636	0.0026 3696	0.0025 1240	195
196	0.0030 1576	0.0027 4277	0.0026 1374	0.0024 8955	196
197	0.0029 9178	0.0027 1945	0.0025 9077	0.0024 6696	197
198	0.0029 6806	0.0026 9639	0.0025 6807	0.0024 4464	198
199	0.0029 4459	0.0026 7358	0.0025 4562	0.0024 2256	199
200	0.0029 2138	0.0026 5103	0.0025 2343	0.0024 0074	200

Annuity Whose Amount at Compound Interest is 1

$$s^{-1}_{\overline{n|}}=i/[(1+i)^n-1]$$

n	¾%	⅞%	1%	1⅛%	*n*
1	1.0000 0000	1.0000 0000	1.0000 0000	1.0000 0000	1
2	0.4981 3200	0.4978 2203	0.4975 1244	0.4972 0323	2
3	0.3308 4579	0.3304 3361	0.3300 2211	0.3296 1130	3
4	0.2472 0501	0.2467 4257	0.2462 8109	0.2458 2058	4
5	0.1970 2242	0.1965 3049	0.1960 3980	0.1955 5034	5
6	0.1635 6891	0.1630 5789	0.1625 4837	0.1620 4034	6
7	0.1396 7488	0.1391 5070	0.1386 2828	0.1381 0762	7
8	0.1217 5552	0.1212 2190	0.1206 9029	0.1201 6071	8
9	0.1078 1929	0.1072 7868	0.1067 4036	0.1062 0432	9
10	0.0966 7123	0.0961 2538	0.0955 8208	0.0950 4131	10
11	0.0875 5094	0.0870 0111	0.0864 5408	0.0859 0984	11
12	0.0799 5148	0.0793 9860	0.0788 4879	0.0783 0203	12
13	0.0735 2188	0.0729 6669	0.0724 1482	0.0718 6626	13
14	0.0680 1146	0.0674 5453	0.0669 0117	0.0663 5138	14
15	0.0632 3639	0.0626 7817	0.0621 2378	0.0615 7321	15
16	0.0590 5879	0.0584 9965	0.0579 4460	0.0573 9363	16
17	0.0553 7321	0.0548 1346	0.0542 5806	0.0537 0698	17
18	0.0520 9766	0.0515 3756	0.0509 8205	0.0504 3113	18
19	0.0491 6740	0.0486 0715	0.0480 5175	0.0475 0120	19
20	0.0465 3063	0.0459 7042	0.0454 1531	0.0448 6531	20
21	0.0441 4543	0.0435 8541	0.0430 3075	0.0424 8145	21
22	0.0419 7748	0.0414 1779	0.0408 6372	0.0403 1525	22
23	0.0399 9846	0.0394 3921	0.0388 8584	0.0383 3833	23
24	0.0381 8474	0.0376 2604	0.0370 7347	0.0365 2701	24
25	0.0365 1650	0.0359 5843	0.0354 0675	0.0348 6144	25
26	0.0349 7693	0.0344 1959	0.0338 6888	0.0333 2479	26
27	0.0335 5176	0.0329 9520	0.0324 4553	0.0319 0273	27
28	0.0322 2871	0.0316 7300	0.0311 2444	0.0305 8299	28
29	0.0309 9723	0.0304 4243	0.0298 9502	0.0293 5498	29
30	0.0298 4816	0.0292 9434	0.0287 4811	0.0282 0953	30
31	0.0287 7352	0.0282 2068	0.0276 7573	0.0271 3866	31
32	0.0277 6634	0.0272 1454	0.0266 7089	0.0261 3535	32
33	0.0268 2048	0.0262 6976	0.0257 2744	0.0251 9349	33
34	0.0259 3053	0.0253 8092	0.0248 3997	0.0243 0763	34
35	0.0250 9170	0.0245 4324	0.0240 0368	0.0234 7299	35
36	0.0242 9973	0.0237 5244	0.0232 1431	0.0226 8529	36
37	0.0235 5082	0.0230 0473	0.0224 6805	0.0219 4072	37
38	0.0228 4157	0.0222 9671	0.0217 6150	0.0212 3589	38
39	0.0221 6893	0.0216 2531	0.0210 9160	0.0205 6773	39
40	0.0215 3016	0.0209 8780	0.0204 5560	0.0199 3349	40
41	0.0209 2276	0.0203 8169	0.0198 5102	0.0193 3069	41
42	0.0203 4452	0.0198 0475	0.0192 7563	0.0187 5709	42
43	0.0197 9338	0.0192 5493	0.0187 2737	0.0182 1064	43
44	0.0192 6751	0.0187 3039	0.0182 0441	0.0176 8949	44
45	0.0187 6521	0.0182 2943	0.0177 0505	0.0171 9197	45
46	0.0182 8495	0.0177 5053	0.0172 2775	0.0167 1652	46
47	0.0178 2532	0.0172 9228	0.0167 7111	0.0162 6173	47
48	0.0173 8504	0.0168 5338	0.0163 3384	0.0158 2632	48
49	0.0169 6292	0.0164 3265	0.0159 1474	0.0154 0910	49
50	0.0165 5787	0.0160 2900	0.0155 1273	0.0150 0898	50

Annuity Whose Amount at Compound Interest is 1

$$s_{\overline{n|}}^{-1} = i/[(1+i)^n - 1]$$

n	¾%	⅞%	1%	1⅛%	n
51	0.0161 6888	0.0156 4142	0.0151 2680	0.0146 2494	51
52	0.0157 9503	0.0152 6899	0.0147 5603	0.0142 5606	52
53	0.0154 3546	0.0149 1084	0.0143 9956	0.0139 0149	53
54	0.0150 8938	0.0145 6619	0.0140 5658	0.0135 6043	54
55	0.0147 5605	0.0142 3430	0.0137 2637	0.0132 3213	55
56	0.0144 3478	0.0139 1449	0.0134 0824	0.0129 1592	56
57	0.0141 2496	0.0136 0611	0.0131 0156	0.0126 1116	57
58	0.0138 2597	0.0133 0858	0.0128 0573	0.0123 1726	58
59	0.0135 3727	0.0130 2135	0.0125 2020	0.0120 3366	59
60	0.0132 5836	0.0127 4390	0.0122 4445	0.0117 5985	60
61	0.0129 8873	0.0124 7575	0.0119 7800	0.0114 9534	61
62	0.0127 2795	0.0122 1644	0.0117 2041	0.0111 3969	62
63	0.0124 7560	0.0119 6557	0.0114 7125	0.0109 9247	63
64	0.0122 3127	0.0117 2273	0.0112 3013	0.0107 5329	64
65	0.0119 9460	0.0114 8754	0.0109 9667	0.0105 2178	65
66	0.0117 6524	0.0112 5968	0.0107 7052	0.0102 9758	66
67	0.0115 4286	0.0110 3879	0.0105 5136	0.0100 8037	67
68	0.0113 2716	0.0108 2459	0.0103 3889	0.0098 6985	68
69	0.0111 1785	0.0106 1677	0.0101 3280	0.0096 6571	69
70	0.0109 1464	0.0104 1506	0.0099 3282	0.0094 6769	70
71	0.0107 1728	0.0102 1921	0.0097 3870	0.0092 7552	71
72	0.0105 2554	0.0100 2897	0.0095 5019	0.0090 8896	72
73	0.0103 3917	0.0098 4411	0.0093 6706	0.0089 0779	73
74	0.0101 5796	0.0096 6441	0.0091 8910	0.0087 3177	74
75	0.0099 8170	0.0094 8966	0.0090 1609	0.0085 6072	75
76	0.0098 1020	0.0093 1967	0.0088 4784	0.0083 9442	76
77	0.0096 4328	0.0091 5426	0.0086 8416	0.0082 3269	77
78	0.0094 8074	0.0089 9324	0.0085 2488	0.0080 7536	78
79	0.0093 2244	0.0088 3645	0.0083 6983	0.0079 2226	79
80	0.0091 6821	0.0086 8374	0.0082 1885	0.0077 7323	80
81	0.0090 1790	0.0085 3494	0.0080 7179	0.0076 2812	81
82	0.0088 7136	0.0083 8992	0.0079 2851	0.0074 8678	82
83	0.0087 2847	0.0082 4854	0.0077 8887	0.0073 4908	83
84	0.0085 8908	0.0081 1067	0.0076 5273	0.0072 1489	84
85	0.0084 5308	0.0079 7619	0.0075 1998	0.0070 8409	85
86	0.0083 2034	0.0078 4497	0.0073 9050	0.0069 5654	86
87	0.0081 9076	0.0077 1691	0.0072 6417	0.0068 3215	87
88	0.0080 6423	0.0075 9190	0.0071 4089	0.0067 1081	88
89	0.0079 4064	0.0074 6982	0.0070 2056	0.0065 9240	89
90	0.0078 1989	0.0073 5060	0.0069 0306	0.0064 7684	90
91	0.0077 0190	0.0072 3413	0.0067 8832	0.0063 6403	91
92	0.0075 8657	0.0071 2031	0.0066 7624	0.0062 5387	92
93	0.0074 7382	0.0070 0908	0.0065 6673	0.0061 4629	93
94	0.0073 6356	0.0069 0033	0.0064 5971	0.0060 4119	94
95	0.0072 5571	0.0067 9401	0.0063 5511	0.0059 3851	95
96	0.0071 5020	0.0066 9002	0.0062 5284	0.0058 3816	96
97	0.0070 4696	0.0065 8829	0.0061 5284	0.0057 4007	97
98	0.0069 4592	0.0064 8877	0.0060 5503	0.0056 4418	98
99	0.0068 4701	0.0063 9137	0.0059 5936	0.0055 5041	99
100	0.0067 5017	0.0062 9604	0.0058 6574	0.0054 5870	100

Annuity Whose Amount at Compound Interest is 1

$$s^{-1}_{\overline{n}|} = i/[(1+i)^n - 1]$$

n	¾%	⅞%	1%	1⅛%	n
101	0.0066 5533	0.0062 0271	0.0057 7413	0.0053 6899	101
102	0.0065 6243	0.0061 1133	0.0056 8446	0.0052 8122	102
103	0.0064 7143	0.0060 2184	0.0055 9668	0.0051 9534	103
104	0.0063 8226	0.0059 3418	0.0055 1073	0.0051 1128	104
105	0.0062 9487	0.0058 4830	0.0054 2656	0.0050 2900	105
106	0.0062 0922	0.0057 6415	0.0053 4412	0.0049 4844	106
107	0.0061 2524	0.0056 8169	0.0052 6336	0.0048 6956	107
108	0.0060 4291	0.0056 0086	0.0051 8423	0.0047 9231	108
109	0.0059 6217	0.0055 2162	0.0051 0669	0.0047 1665	109
110	0.0058 8296	0.0054 4393	0.0050 3069	0.0046 4252	110
111	0.0058 0527	0.0053 6774	0.0049 5620	0.0045 6990	111
112	0.0057 2905	0.0052 9301	0.0048 8317	0.0044 9873	112
113	0.0056 5425	0.0052 1971	0.0048 1156	0.0044 2898	113
114	0.0055 8084	0.0051 4780	0.0047 4133	0.0043 6061	114
115	0.0055 0878	0.0050 7724	0.0046 7245	0.0042 9358	115
116	0.0054 3803	0.0050 0799	0.0046 0488	0.0042 2786	116
117	0.0053 6857	0.0049 4003	0.0045 3860	0.0041 6342	117
118	0.0053 0037	0.0048 7331	0.0044 7356	0.0041 0022	118
119	0.0052 3338	0.0048 0781	0.0044 0973	0.0040 3824	119
120	0.0051 6758	0.0047 4350	0.0043 4709	0.0039 7743	120
121	0.0051 0294	0.0046 8034	0.0042 8561	0.0039 1777	121
122	0.0050 3942	0.0046 1832	0.0042 2525	0.0038 5924	122
123	0.0049 7702	0.0045 5740	0.0041 6599	0.0038 0179	123
124	0.0049 1568	0.0044 9754	0.0041 0780	0.0037 4542	124
125	0.0048 5540	0.0044 3874	0.0040 5065	0.0036 9008	125
126	0.0047 9614	0.0043 8096	0.0039 9452	0.0036 3576	126
127	0.0047 3788	0.0043 2418	0.0039 3939	0.0035 8244	127
128	0.0046 8060	0.0042 6838	0 0038 8524	0.0035 3008	128
129	0.0046 2428	0.0042 1352	0.0038 3203	0.0034 7866	129
130	0.0045 6888	0.0041 5960	0.0037 7975	0.0034 2817	130
131	0.0045 1440	0.0041 0659	0.0037 2837	0.0033 7858	131
132	0.0044 6080	0.0040 5446	0.0036 7788	0.0033 2987	132
133	0.0044 0808	0.0040 0320	0.0036 2825	0.0032 8202	133
134	0.0043 5621	0.0039 5279	0.0035 7947	0.0032 3501	134
135	0.0043 0516	0.0039 0321	0.0035 3151	0.0031 8882	135
136	0.0042 5493	0.0038 5444	0.0034 8437	0.0031 4343	136
137	0.0042 0550	0.0038 0646	0.0034 3801	0.0030 9883	137
138	0.0041 5684	0.0037 5926	0.0033 9242	0.0030 5499	138
139	0.0041 0894	0.0037 1281	0.0033 4759	0.0030 1190	139
140	0.0040 6179	0.0036 6711	0.0033 0349	0.0029 6955	140
141	0.0040 1536	0.0036 2213	0.0032 6012	0.0029 2792	141
142	0.0039 6965	0.0035 7787	0.0032 1746	0.0028 8699	142
143	0.0039 2464	0.0035 3430	0.0031 7549	0.0028 4674	143
144	0.0038 8031	0.0034 9141	0.0031 3419	0.0028 0717	144
145	0.0038 3664	0.0034 4918	0.0030 9356	0.0027 6826	145
146	0.0037 9364	0.0034 0761	0.0030 5358	0.0027 2999	146
147	0.0037 5127	0.0033 6668	0.0030 1423	0.0026 9235	147
148	0.0037 0953	0.0033 2638	0.0029 7551	0.0026 5533	148
149	0.0036 6841	0.0032 8669	0.0029 3739	0.0026 1891	149
150	0.0036 2790	0.0032 4760	0.0028 9988	0.0025 8309	150

Annuity Whose Amount at Compound Interest is 1

$$s_{\overline{n|}}^{-1} = i/[(1+i)^n - 1]$$

n	¾%	⅞%	1%	1⅛%	*n*
151	0.0035 8797	0.0032 0910	0.0028 6294	0.0025 4784	151
152	0.0035 4862	0.0031 7117	0.0028 2659	0.0025 1317	152
153	0.0035 0984	0.0031 3381	0.0027 9079	0.0024 7905	153
154	0.0034 7162	0.0030 9701	0.0027 5554	0.0024 4547	154
155	0.0034 3395	0.0030 6075	0.0027 2084	0.0024 1243	155
156	0.0033 9680	0.0030 2502	0.0026 8666	0.0023 7992	156
157	0.0033 6019	0.0029 8981	0.0026 5300	0.0023 4791	157
158	0.0033 2409	0.0029 5512	0.0026 1986	0.0023 1642	158
159	0.0032 8849	0.0029 2093	0.0025 8720	0.0022 8541	159
160	0.0032 5340	0.0028 8724	0.0025 5504	0.0022 5489	160
161	0.0032 1878	0.0028 5402	0.0025 2336	0.0022 2484	161
162	0.0031 8465	0.0028 2128	0.0024 9215	0.0021 9526	162
163	0.0031 5098	0.0027 8901	0.0024 6141	0.0021 6614	163
164	0.0031 1777	0.0027 5720	0.0024 3111	0.0021 3746	164
165	0.0030 8502	0.0027 2583	0.0024 0126	0.0021 0923	165
166	0.0030 5270	0.0026 9490	0.0023 7185	0.0020 8142	166
167	0.0030 2083	0.0026 6441	0.0023 4286	0.0020 5404	167
168	0.0029 8937	0.0026 3434	0.0023 1430	0.0020 2707	168
169	0.0029 5834	0.0026 0469	0.0022 8614	0.0020 0051	169
170	0.0029 2772	0.0025 7544	0.0022 5840	0.0019 7435	170
171	0.0028 9751	0.0025 4660	0.0022 3105	0.0019 4858	171
172	0.0028 6769	0.0025 1816	0.0022 0409	0.0019 2319	172
173	0.0028 3827	0.0024 9010	0.0021 7751	0.0018 9819	173
174	0.0028 0922	0.0024 6242	0.0021 5132	0.0018 7356	174
175	0.0027 8056	0.0024 3512	0.0021 2549	0.0018 4929	175
176	0.0027 5226	0.0024 0818	0.0021 0003	0.0018 2537	176
177	0.0027 2433	0.0023 8161	0.0020 7492	0.0018 0182	177
178	0.0026 9676	0.0023 5539	0.0020 5016	0.0017 7860	178
179	0.0026 6954	0.0023 2952	0.0020 2575	0.0017 5573	179
180	0.0026 4267	0.0023 0399	0.0020 0168	0.0017 3319	180
181	0.0026 1613	0.0022 7880	0.0019 7794	0.0017 1097	181
182	0.0025 8993	0.0022 5394	0.0019 5453	0.0016 8908	182
183	0.0025 6406	0.0022 2941	0.0019 3144	0.0016 6750	183
184	0.0025 3851	0.0022 0520	0.0019 0867	0.0016 4624	184
185	0.0025 1328	0.0021 8130	0.0018 8621	0.0016 2528	185
186	0.0024 8837	0.0021 5771	0.0018 6405	0.0016 0462	186
187	0.0024 6376	0.0021 3443	0.0018 4219	0.0015 8425	187
188	0.0024 3945	0.0021 1145	0.0018 2063	0.0015 6418	188
189	0.0024 1544	0.0020 8876	0.0017 9936	0.0015 4439	189
190	0.0023 9173	0.0020 6637	0.0017 7838	0.0015 2488	190
191	0.0023 6830	0.0020 4425	0.0017 5768	0.0015 0564	191
192	0.0023 4516	0.0020 2242	0.0017 3725	0.0014 8668	192
193	0.0023 2230	0.0020 0087	0.0017 1710	0.0014 6798	193
194	0.0022 9971	0.0019 7959	0.0016 9721	0.0014 4955	194
195	0.0022 7739	0.0019 5857	0.0016 7759	0.0014 3137	195
196	0.0022 5534	0.0019 3782	0.0016 5822	0.0014 1345	196
197	0.0022 3355	0.0019 1733	0.0016 3911	0.0013 9577	197
198	0.0022 1202	0.0018 9709	0.0016 2026	0.0013 7834	198
199	0.0021 9074	0.0018 7711	0.0016 0164	0.0013 6115	199
200	0.0021 6972	0.0018 5737	0.0015 8328	0.0013 4420	200

Annuity Whose Amount at Compound Interest is 1

$$s_{\overline{n}|}^{-1} = i/[(1+i)^n - 1]$$

n	1¼%	1⅜%	1½%	1¾%	n
1	1.0000 0000	1.0000 0000	1.0000 0000	1.0000 0000	1
2	0.4968 9441	0.4965 8597	0.4962 7792	0.4956 6295	2
3	0.3292 0117	0.3287 9173	0.3283 8296	0.3275 6746	3
4	0.2453 6102	0.2449 0243	0.2444 4478	0.2435 3237	4
5	0.1950 6211	0.1945 7510	0.1940 8932	0.1931 2142	5
6	0.1615 3381	0.1610 2877	0.1605 2521	0.1595 2256	6
7	0.1375 8872	0.1370 7157	0.1365 5616	0.1355 3059	7
8	0.1196 3314	0.1191 0758	0.1185 8402	0.1175 4292	8
9	0.1056 7055	0.1051 3906	0.1046 0982	0.1035 5813	9
10	0.0945 0307	0.0939 6737	0.0934 3418	0.0923 7534	10
11	0.0853 6839	0.0848 2973	0.0842 9384	0.0832 3038	11
12	0.0777 5831	0.0772 1764	0.0766 7999	0.0756 1377	12
13	0.0713 2100	0.0707 7903	0.0702 4036	0.0691 7283	13
14	0.0658 0515	0.0652 6246	0.0647 2332	0.0636 5562	14
15	0.0610 2646	0.0604 8351	0.0599 4436	0.0588 7739	15
16	0.0568 4672	0.0563 0388	0.0557 6508	0.0546 9958	16
17	0.0531 6023	0.0526 1780	0.0520 7966	0.0510 1623	17
18	0.0498 8479	0.0493 4301	0.0488 0578	0.0477 4492	18
19	0.0469 5548	0.0464 1457	0.0458 7847	0.0448 2061	19
20	0.0443 2039	0.0437 8054	0.0432 4574	0.0421 9122	20
21	0.0419 3748	0.0413 9884	0.0408 6550	0.0398 1464	21
22	0.0397 7238	0.0392 3507	0.0387 0331	0.0376 5638	22
23	0.0377 9666	0.0372 6080	0.0367 3075	0.0356 8796	23
24	0.0359 8665	0.0354 5235	0.0349 2410	0.0338 8565	24
25	0.0343 2247	0.0337 8981	0.0332 6345	0.0322 2952	25
26	0.0327 8729	0.0322 5635	0.0317 3196	0.0307 0269	26
27	0.0313 6677	0.0308 3763	0.0303 1527	0.0292 9079	27
28	0.0300 4863	0.0295 2134	0.0290 0108	0.0279 8151	28
29	0.0288 2228	0.0282 9689	0.0277 7878	0.0267 6424	29
30	0.0276 7854	0.0261 5511	0.0266 3919	0.0256 2975	30
31	0.0266 0942	0.0260 8798	0.0255 7430	0.0245 7005	31
32	0.0256 0791	0.0250 8850	0.0245 7710	0.0235 7812	32
33	0.0246 6786	0.0241 5053	0.0236 4144	0.0226 4779	33
34	0.0237 8387	0.0232 6864	0.0227 6189	0.0217 7363	34
35	0.0229 5111	0.0224 3801	0.0219 3363	0.0209 5082	35
36	0.0221 6533	0.0216 5438	0.0211 5240	0.0201 7507	36
37	0.0214 2270	0.0209 1394	0.0204 1437	0.0194 4257	37
38	0.0207 1983	0.0202 1327	0.0197 1613	0.0187 4990	38
39	0.0200 5365	0.0195 4931	0.0190 5463	0.0180 9399	39
40	0.0194 2141	0.0189 1931	0.0184 2710	0.0174 7209	40
41	0.0188 2063	0.0183 2078	0.0178 3106	0.0168 8170	41
42	0.0182 4906	0.0177 5148	0.0172 6426	0.0163 2057	42
43	0.0177 0466	0.0172 0936	0.0167 2465	0.0157 8666	43
44	0.0171 8557	0.0166 9257	0.0162 1038	0.0152 7810	44
45	0.0166 9012	0.0161 9941	0.0157 1976	0.0147 9321	45
46	0.0162 1675	0.0157 2836	0.0152 5125	0.0143 3043	46
47	0.0157 6406	0.0152 7799	0.0148 0342	0.0138 8836	47
48	0.0153 3075	0.0148 4701	0.0143 7500	0.0134 6569	48
49	0.0149 1563	0.0144 3424	0.0139 6478	0.0130 6124	49
50	0.0145 1763	0.0140 3857	0.0135 7168	0.0126 7391	50

Annuity Whose Amount at Compound Interest is 1

$$s^{-1}_{\overline{n|}}=i/[(1+i)^n-1]$$

n	1¼%	1⅜%	1½%	1¾%	*n*
51	0.0141 3571	0.0136 5900	0.0131 9469	0.0123 0269	51
52	0.0137 6897	0.0132 9461	0.0128 3287	0.0119 4665	52
53	0.0134 1653	0.0128 4453	0.0124 8537	0.0116 0492	53
54	0.0130 7760	0.0126 0797	0.0121 5138	0.0112 7672	54
55	0.0127 5145	0.0122 8418	0.0118 3018	0.0109 6129	55
56	0.0124 3739	0.0119 7249	0.0115 2106	0.0106 5795	56
57	0.0121 3478	0.0116 7225	0.0112 2341	0.0103 6606	57
58	0.0118 4303	0.0113 8287	0.0109 3661	0.0100 8503	58
59	0.0115 6158	0.0111 0380	0.0106 6012	0.0098 1430	59
60	0.0112 8993	0.0108 3452	0.0103 9343	0.0095 5336	60
61	0.0110 2758	0.0105 7455	0.0101 3604	0.0093 0172	61
62	0.0107 7410	0.0103 2344	0.0098 8751	0.0090 5892	62
63	0.0105 2904	0.0100 8076	0.0096 4741	0.0088 2455	63
64	0.0102 9203	0.0098 4612	0.0094 1534	0.0085 9821	64
65	0.0100 6268	0.0096 1914	0.0091 9094	0.0083 7952	65
66	0.0098 4065	0.0093 9949	0.0089 7386	0.0081 6813	66
67	0.0096 2560	0.0091 8682	0.0087 6376	0.0079 6372	67
68	0.0094 1724	0.0089 8082	0.0085 6033	0.0077 6596	68
69	0.0092 1527	0.0087 8122	0.0083 6329	0.0075 7459	69
70	0.0090 1941	0.0085 8773	0.0081 7235	0.0073 8930	70
71	0.0088 2941	0.0084 0009	0.0079 8727	0.0072 0985	71
72	0.0086 4501	0.0082 1806	0.0078 0779	0.0070 3600	72
73	0.0084 6600	0.0080 4140	0.0076 3368	0.0068 6750	73
74	0.0082 9215	0.0078 6991	0.0074 6473	0.0067 0413	74
75	0.0081 2325	0.0077 0336	0.0073 0072	0.0065 4570	75
76	0.0079 5910	0.0075 4157	0.0071 4146	0.0063 9200	76
77	0.0077 9953	0.0073 8435	0.0069 8676	0.0062 4284	77
78	0.0076 4435	0.0072 3151	0.0068 3645	0.0060 9806	78
79	0.0074 9341	0.0070 8290	0.0066 9036	0.0059 5748	79
80	0.0073 4652	0.0069 3836	0.0065 4832	0.0058 2093	80
81	0.0072 0356	0.0067 9772	0.0064 1019	0.0056 8828	81
82	0.0070 6437	0.0066 6086	0.0062 7583	0.0055 5936	82
83	0.0069 2881	0.0065 2762	0.0061 4509	0.0054 3406	83
84	0.0067 9675	0.0063 9789	0.0060 1784	0.0053 1223	84
85	0.0066 6808	0.0062 7153	0.0058 9396	0.0051 9375	85
86	0.0065 4267	0.0061 4843	0.0057 7333	0.0050 7850	86
87	0.0064 2041	0.0060 2847	0.0056 5584	0.0049 6636	87
88	0.0063 0119	0.0059 1155	0.0055 4138	0.0048 5724	88
89	0.0061 8490	0.0057 9756	0.0054 2984	0.0047 5102	89
90	0.0060 7146	0.0056 8641	0.0053 2113	0.0046 4760	90
91	0.0059 6076	0.0055 7799	0.0052 1516	0.0045 4690	91
92	0.0058 5271	0.0054 7222	0.0051 1182	0.0044 4882	92
93	0.0057 4724	0.0053 6902	0.0050 1104	0.0043 5327	93
94	0.0056 4425	0.0052 6829	0.0049 1273	0.0042 6017	94
95	0.0055 4366	0.0051 6997	0.0048 1681	0.0041 6944	95
96	0.0054 4540	0.0050 7397	0.0047 2321	0.0040 8101	96
97	0.0053 4941	0.0049 8022	0.0046 3186	0.0039 9480	97
98	0.0052 5560	0.0048 8866	0.0045 4268	0.0039 1074	98
99	0.0051 6391	0.0047 9921	0.0044 5560	0.0038 2876	99
100	0.0050 7428	0.0047 1181	0.0043 7057	0.0037 4880	100

Annuity Whose Amount at Compound Interest is 1

$$s^{-1}_{\overline{n}|}=i/[(1+i)^n-1]$$

n	2%	2¼%	2½%	2¾%	n
1	1.0000 0000	1.0000 0000	1.0000 0000	1.0000 0000	1
2	0.4950 4950	0.4944 3758	0.4938 2716	0.4932 1825	2
3	0.3267 5467	0.3259 4458	0.3251 3717	0.3243 3243	3
4	0.2426 2375	0.2417 1893	0.2408 1788	0.2399 2059	4
5	0.1921 5839	0.1912 0021	0.1902 4686	0.1892 9832	5
6	0.1585 2581	0.1575 3496	0.1565 4997	0.1555 7083	6
7	0.1345 1196	0.1335 0025	0.1324 9543	0.1314 9747	7
8	0.1165 0980	0.1154 8462	0.1144 6735	0.1134 5795	8
9	0.1025 1544	0.1014 8170	0.1004 5689	0.0994 4095	9
10	0.0913 2653	0.0902 8768	0.0892 5876	0.0882 3972	10
11	0.0821 7794	0.0811 3649	0.0801 0596	0.0790 8629	11
12	0.0745 5960	0.0735 1740	0.0724 8713	0.0714 6871	12
13	0.0681 1835	0.0670 7686	0.0660 4827	0.0650 3252	13
14	0.0626 0197	0.0615 6230	0.0605 3653	0.0595 2457	14
15	0.0578 2547	0.0567 8852	0.0557 6646	0.0547 5917	15
16	0.0536 5013	0.0526 1663	0.0515 9899	0.0505 9710	16
17	0.0499 6984	0.0489 4039	0.0479 2777	0.0469 3186	17
18	0.0467 0210	0.0456 7720	0.0446 7008	0.0436 8063	18
19	0.0437 8177	0.0427 6182	0.0417 6062	0.0407 7802	19
20	0.0411 5672	0.0401 4207	0.0391 4713	0.0381 7173	20
21	0.0387 8477	0.0377 7572	0.0367 8733	0.0358 1941	21
22	0.0366 3140	0.0356 2821	0.0346 4661	0.0336 8640	22
23	0.0346 6810	0.0336 7097	0.0326 9638	0.0317 4410	23
24	0.0328 7110	0.0318 8023	0.0309 1282	0.0299 6863	24
25	0.0312 2044	0.0302 3599	0.0292 7592	0.0283 3997	25
26	0.0296 9923	0.0287 2134	0.0277 6875	0.0268 4116	26
27	0.0282 9309	0.0273 2188	0.0263 7687	0.0254 5776	27
28	0.0269 8967	0.0260 2525	0.0250 8793	0.0241 7738	28
29	0.0257 7836	0.0248 2081	0.0238 9127	0.0229 8935	29
30	0.0246 4992	0.0236 9934	0.0227 7764	0.0218 8442	30
31	0.0235 9635	0.0226 5280	0.0217 3900	0.0208 5453	31
32	0.0226 1061	0.0216 7415	0.0207 6831	0.0198 9263	32
33	0.0216 8653	0.0207 5722	0.0198 5938	0.0189 9253	33
34	0.0208 1867	0.0198 9655	0.0190 0675	0.0181 4875	34
35	0.0200 0221	0.0190 8731	0.0182 0558	0.0173 5645	35
36	0.0192 3285	0.0183 2522	0.0174 5158	0.0166 1132	36
37	0.0185 0678	0.0176 0643	0.0167 4090	0.0159 0953	37
38	0.0178 2057	0.0169 2753	0.0160 7012	0.0152 4764	38
39	0.0171 7114	0.0162 8543	0.0154 3615	0.0146 2256	39
40	0.0165 5575	0.0156 7738	0.0148 3623	0.0140 3151	40
41	0.0159 7188	0.0151 0087	0.0142 6786	0.0134 7200	41
42	0.0154 1729	0.0145 5364	0.0137 2876	0.0129 4175	42
43	0.0148 8993	0.0140 3364	0.0132 1688	0.0124 3871	43
44	0.0143 8794	0.0135 3901	0.0127 3037	0.0119 6100	44
45	0.0139 0962	0.0130 6805	0.0122 6752	0.0115 0693	45
46	0.0134 5342	0.0126 1921	0.0118 2676	0.0110 7493	46
47	0.0130 1792	0.0121 9107	0.0114 0669	0.0106 6358	47
48	0.0126 0184	0.0117 8233	0.0110 0599	0.0102 7158	48
49	0.0122 0396	0.0113 9179	0.0106 2348	0.0098 9773	49
50	0.0118 2321	0.0110 1836	0.0102 5806	0.0095 4092	50

Annuity Whose Amount at Compound Interest is 1

$$s_{\overline{n}|}^{-1}=i/[(1+i)^n-1]$$

n	2%	2¼%	2½%	2¾%	*n*
51	0.0114 5856	0.0106 6102	0.0099 0870	0.0092 0014	51
52	0.0111 0909	0.0103 1884	0.0095 7446	0.0088 7444	52
53	0.0107 7392	0.0099 9094	0.0092 5449	0.0085 6297	53
54	0.0104 5226	0.0096 7654	0.0089 4799	0.0082 6491	54
55	0.0101 4337	0.0093 7489	0.0086 5419	0.0079 7953	55
56	0.0098 4656	0.0090 8530	0.0083 7243	0.0077 0612	56
57	0.0095 6120	0.0088 0712	0.0081 0204	0.0074 4404	57
58	0.0092 8667	0.0085 3977	0.0078 4244	0.0071 9270	58
59	0.0090 2243	0.0082 8268	0.0075 9307	0.0069 5153	59
60	0.0087 6797	0.0080 3533	0.0073 5340	0.0067 2002	60
61	0.0085 2278	0.0077 9724	0.0071 2294	0.0064 9767	61
62	0.0082 8643	0.0075 6795	0.0069 0126	0.0062 8402	62
63	0.0080 5848	0.0073 4704	0.0066 8790	0.0060 7866	63
64	0.0078 3855	0.0071 3411	0.0064 8249	0.0058 8118	64
65	0.0076 2624	0.0069 2878	0.0062 8463	0.0056 9120	65
66	0.0074 2122	0.0067 3070	0.0060 9398	0.0055 0837	66
67	0.0072 2316	0.0065 3955	0.0059 1021	0.0053 3236	67
68	0.0070 3173	0.0063 5500	0.0057 3300	0.0051 6285	68
69	0.0068 4665	0.0061 7677	0.0055 6206	0.0049 9955	69
70	0.0066 6765	0.0060 0458	0.0053 9712	0.0048 4218	70
71	0.0064 9446	0.0058 3816	0.0052 3790	0.0046 9048	71
72	0.0063 2683	0.0056 7728	0.0050 8417	0.0045 4420	72
73	0.0061 6454	0.0055 2169	0.0049 3568	0.0044 0311	73
74	0.0060 0736	0.0053 7118	0.0047 9222	0.0042 6698	74
75	0.0058 5508	0.0052 2554	0.0046 5358	0.0041 3560	75
76	0.0057 0751	0.0050 8457	0.0045 1956	0.0040 0878	76
77	0.0055 6447	0.0049 4808	0.0043 8997	0.0038 8633	77
78	0.0054 2576	0.0048 1589	0.0042 6463	0.0037 6806	78
79	0.0052 9123	0.0046 8784	0.0041 4338	0.0036 5382	79
80	0.0051 6071	0.0045 6376	0.0040 2605	0.0035 4342	80
81	0.0050 3405	0.0044 4350	0.0039 1248	0.0034 3674	81
82	0.0049 1110	0.0043 2692	0.0038 0254	0.0033 3361	82
83	0.0047 9173	0.0042 1387	0.0036 9608	0.0032 3389	83
84	0.0046 7581	0.0041 0423	0.0035 9298	0.0031 3747	84
85	0.0045 6321	0.0039 9787	0.0034 9310	0.0030 4420	85
86	0.0044 5381	0.0038 9467	0.0033 9633	0.0029 5397	86
87	0.0043 4750	0.0037 9452	0.0033 0255	0.0028 6667	87
88	0.0042 4416	0.0036 9730	0.0032 1165	0.0027 8219	88
89	0.0041 4370	0.0036 0291	0.0031 2353	0.0027 0041	89
90	0.0040 4602	0.0035 1126	0.0030 3809	0.0026 2125	90
91	0.0039 5101	0.0034 2224	0.0029 5523	0.0025 4460	91
92	0.0038 5859	0.0033 3577	0.0028 7486	0.0024 7038	92
93	0.0037 6868	0.0032 5176	0.0027 9690	0.0023 9850	93
94	0.0036 8118	0.0031 7012	0.0027 2126	0.0023 2887	94
95	0.0035 9602	0.0030 9078	0.0026 4786	0.0022 6141	95
96	0.0035 1313	0.0030 1366	0.0025 7662	0.0021 9605	96
97	0.0034 3242	0.0029 3868	0.0025 0747	0.0021 3272	97
98	0.0033 5383	0.0028 6578	0.0024 4034	0.0020 7134	98
99	0.0032 7729	0.0027 9489	0.0023 7517	0.0020 1185	99
100	0.0032 0274	0.0027 2594	0.0023 1188	0.0019 5418	100

Annuity Whose Amount at Compound Interest is 1

$$s^{-1}_{\overline{n}|}=i/[(1+i)^n-1]$$

n	3%	3½%	4%	4½%	n
1	1.0000 0000	1.0000 0000	1.0000 0000	1.0000 0000	1
2	0.4926 1084	0.4914 0049	0.4901 9608	0.4889 9756	2
3	0.3235 3036	0.3219 3418	0.3203 4854	0.3187 7336	3
4	0.2390 2705	0.2372 5114	0.2354 9005	0.2337 4365	4
5	0.1883 5457	0.1864 8137	0.1846 2711	0.1827 9164	5
6	0.1545 9750	0.1526 6821	0.1507 6190	0.1488 7839	6
7	0.1305 0635	0.1285 4449	0.1266 0961	0.1247 0147	7
8	0.1124 5639	0.1104 7665	0.1085 2783	0.1066 0965	8
9	0.0984 3386	0.0964 4601	0.0944 9299	0.0925 7447	9
10	0.0872 3051	0.0852 4137	0.0832 9094	0.0813 7882	10
11	0.0780 7745	0.0760 9197	0.0741 4904	0.0722 4818	11
12	0.0704 6209	0.0684 8395	0.0665 5217	0.0646 6619	12
13	0.0640 2954	0.0620 6157	0.0601 4373	0.0582 7535	13
14	0.0585 2634	0.0565 7073	0.0546 6897	0.0528 2032	14
15	0.0537 6658	0.0518 2507	0.0499 4110	0.0481 1381	15
16	0.0496 1085	0.0476 8483	0.0458 2000	0.0440 1537	16
17	0.0459 5253	0.0440 4313	0.0421 9852	0.0404 1758	17
18	0.0427 0870	0.0408 1684	0.0389 9333	0.0372 3690	18
19	0.0398 1388	0.0379 4033	0.0361 3862	0.0344 0734	19
20	0.0372 1571	0.0353 6108	0.0335 8175	0.0318 7614	20
21	0.0348 7178	0.0330 3659	0.0312 8011	0.0296 0057	21
22	0.0327 4739	0.0309 3207	0.0291 9881	0.0275 4565	22
23	0.0308 1390	0.0290 1880	0.0273 0906	0.0256 8249	23
24	0.0290 4742	0.0272 7283	0.0255 8683	0.0239 8703	24
25	0.0274 2787	0.0256 7404	0.0240 1196	0.0224 3903	25
26	0.0259 3829	0.0242 0540	0.0225 6738	0.0210 2137	26
27	0.0245 6421	0.0228 5241	0.0212 3854	0.0197 1946	27
28	0.0232 9323	0.0216 0265	0.0200 1298	0.0185 2081	28
29	0.0221 1467	0.0204 4538	0.0188 7993	0.0174 1461	29
30	0.0210 1926	0.0193 7133	0.0178 3010	0.0163 9154	30
31	0.0199 9893	0.0183 7240	0.0168 5535	0.0154 4345	31
32	0.0190 4662	0.0174 4150	0.0159 4859	0.0145 6320	32
33	0.0181 5612	0.0165 7242	0.0151 0357	0.0137 4453	33
34	0.0173 2196	0.0157 5966	0.0143 1477	0.0129 8191	34
35	0.0165 3929	0.0149 9835	0.0135 7732	0.0122 7045	35
36	0.0158 0379	0.0142 8416	0.0128 8688	0.0116 0578	36
37	0.0151 1162	0.0136 1325	0.0122 3957	0.0109 8402	37
38	0.0144 5934	0.0129 8214	0.0116 3192	0.0104 0169	38
39	0.0138 4385	0.0123 8775	0.0110 6083	0.0098 5567	39
40	0.0132 6238	0.0118 2728	0.0105 2349	0.0093 4315	40
41	0.0127 1241	0.0112 9822	0.0100 1738	0.0088 6158	41
42	0.0121 9167	0.0107 9828	0.0095 4020	0.0084 0868	42
43	0.0116 9811	0.0103 2539	0.0090 8989	0.0079 8235	43
44	0.0112 2985	0.0098 7768	0.0086 6454	0.0075 8071	44
45	0.0107 8518	0.0094 5343	0.0082 6246	0.0072 0202	45
46	0.0103 6254	0.0090 5108	0.0078 8205	0.0068 4471	46
47	0.0099 6051	0.0086 6919	0.0075 2189	0.0065 0734	47
48	0.0095 7777	0.0083 0646	0.0071 8065	0.0061 8858	48
49	0.0092 1314	0.0079 6167	0.0068 5712	0.0058 8722	49
50	0.0088 6550	0.0076 3371	0.0065 5020	0.0056 0215	50

Annuity Whose Amount at Compound Interest is 1

$$s^{-1}_{\overline{n}|} = i/[(1+i)^n - 1]$$

n	3%	$3\frac{1}{2}$%	4%	$4\frac{1}{2}$%	n
51	0.0085 3382	0.0073 2156	0.0062 5885	0.0053 3232	51
52	0.0082 1718	0.0070 2429	0.0059 8212	0.0050 7679	52
53	0.0079 1471	0.0067 4100	0.0057 1915	0.0048 3469	53
54	0.0076 2558	0.0064 7090	0.0054 6910	0.0046 0519	54
55	0.0073 4907	0.0062 1323	0.0052 3124	0.0043 8754	55
56	0.0070 8447	0.0059 6730	0.0050 0487	0.0041 8105	56
57	0.0068 3114	0.0057 3245	0.0047 8932	0.0039 8506	57
58	0.0065 8848	0.0055 0810	0.0045 8401	0.0037 9897	58
59	0.0063 5593	0.0052 9366	0.0043 8836	0.0036 2221	59
60	0.0061 3296	0.0050 8862	0.0042 0185	0.0034 5426	60
61	0.0059 1908	0.0048 9249	0.0040 2398	0.0032 9462	61
62	0.0057 1385	0.0047 0480	0.0038 5430	0.0031 4284	62
63	0.0055 1682	0.0045 2513	0.0036 9237	0.0029 9848	63
64	0.0053 2760	0.0043 5308	0.0035 3780	0.0028 6115	64
65	0.0051 4581	0.0041 8826	0.0033 9019	0.0027 3047	65
66	0.0049 7110	0.0040 3031	0.0032 4921	0.0026 0608	66
67	0.0048 0313	0.0038 7892	0.0031 1451	0.0024 8765	67
68	0.0046 4159	0.0037 3375	0.0029 8578	0.0023 7487	68
69	0.0044 8618	0.0035 9453	0.0028 6272	0.0022 6745	69
70	0.0043 3663	0.0034 6095	0.0027 4506	0.0021 6511	70
71	0.0041 9266	0.0033 3277	0.0026 3253	0.0020 6759	71
72	0.0040 5405	0.0032 0973	0.0025 2489	0.0019 7465	72
73	0.0039 2053	0.0030 9160	0.0024 2190	0.0018 8606	73
74	0.0037 9191	0.0029 7816	0.0023 2334	0.0018 0159	74
75	0.0036 6796	0.0028 6919	0.0022 2900	0.0017 2104	75
76	0.0035 4849	0.0027 6450	0.0021 3869	0.0016 4422	76
77	0.0034 3331	0.0026 6390	0.0020 5221	0.0015 7094	77
78	0.0033 2224	0.0025 6721	0.0019 6939	0.0015 0104	78
79	0.0032 1510	0.0024 7426	0.0018 9007	0.0014 3434	79
80	0.0031 1175	0.0023 8489	0.0018 1408	0.0013 7069	80
81	0.0030 1201	0.0022 9894	0.0017 4127	0.0013 0995	81
82	0.0029 1576	0.0022 1628	0.0016 7150	0.0012 5197	82
83	0.0028 2284	0.0021 3676	0.0016 0463	0.0011 9663	83
84	0.0027 3313	0.0020 6025	0.0015 4054	0.0011 4379	84
85	0.0026 4650	0.0019 8662	0.0014 7909	0.0010 9334	85
86	0.0025 6284	0.0019 1576	0.0014 2018	0.0010 4516	86
87	0.0024 8202	0.0018 4756	0.0013 6370	0.0009 9915	87
88	0.0024 0393	0.0017 8190	0.0013 0953	0.0009 5522	88
89	0.0023 2848	0.0017 1868	0.0012 5758	0.0009 1325	89
90	0.0022 5556	0.0016 5781	0.0012 0775	0.0008 7316	90
91	0.0021 8508	0.0015 9919	0.0011 5995	0.0008 3486	91
92	0.0021 1694	0.0015 4273	0.0011 1410	0.0007 9827	92
93	0.0020 5107	0.0014 8834	0.0010 7010	0.0007 6331	93
94	0.0019 8737	0.0014 3594	0.0010 2789	0.0007 2991	94
95	0.0019 2577	0.0013 8546	0.0009 8738	0.0006 9799	95
96	0.0018 6619	0.0013 3682	0.0009 4850	0.0006 6749	96
97	0.0018 0856	0.0012 8995	0.0009 1119	0.0006 3834	97
98	0.0017 5281	0.0012 4478	0.0008 7538	0.0006 1048	98
99	0.0016 9886	0.0012 0124	0.0008 4100	0.0005 8385	99
100	0.0016 4667	0.0011 5927	0.0008 0800	0.0005 5839	100

Annuity Whose Amount at Compound Interest is 1

$$s_{\overline{n|}}^{-1}=i/[(1+i)^n-1]$$

n	5%	5½%	6%	6½%	*n*
1	1.0000 0000	1.0000 0000	1.0000 0000	1.0000 0000	1
2	0.4878 0488	0.4866 1800	0.4854 3689	0.4842 6150	2
3	0.3172 0856	0.3156 5407	0.3141 0981	0.3125 7570	3
4	0.2320 1183	0.2302 9449	0.2285 9149	0.2269 0274	4
5	0.1809 7480	0.1791 7644	0.1773 9640	0.1756 3454	5
6	0.1470 1747	0.1451 7895	0.1433 6263	0.1415 6831	6
7	0.1228 1982	0.1209 6442	0.1191 3502	0.1173 3137	7
8	0.1047 2181	0.1028 6401	0.1010 3594	0.0992 3730	8
9	0.0906 9008	0.0888 3946	0.0870 2224	0.0852 3803	9
10	0.0795 0458	0.0776 6777	0.0758 6796	0.0741 0469	10
11	0.0703 8889	0.0685 7065	0.0667 9294	0.0650 5521	11
12	0.0628 2541	0.0610 2923	0.0592 7703	0.0575 6817	12
13	0.0564 5577	0.0546 8426	0.0529 6011	0.0512 8256	13
14	0.0510 2397	0.0492 7912	0.0475 8491	0.0459 4048	14
15	0.0463 4229	0.0446 2560	0.0429 6276	0.0413 5278	15
16	0.0422 6991	0.0405 8254	0.0389 5214	0.0373 7757	16
17	0.0386 9914	0.0370 4197	0.0354 4480	0.0339 0633	17
18	0.0355 4622	0.0339 1992	0.0323 5654	0.0308 5461	18
19	0.0327 4501	0.0311 5006	0.0296 2086	0.0281 5575	19
20	0.0302 4259	0.0286 7933	0.0271 8456	0.0257 5640	20
21	0.0279 9611	0.0264 6478	0.0250 0455	0.0236 1333	21
22	0.0259 7051	0.0244 7123	0.0230 4557	0.0216 9120	22
23	0.0241 3682	0.0226 6965	0.0212 7848	0.0199 6078	23
24	0.0224 7090	0.0210 3580	0.0196 7900	0.0183 9770	24
25	0.0209 5246	0.0195 4935	0.0182 2672	0.0169 8148	25
26	0.0195 6432	0.0181 9307	0.0169 0435	0.0156 9480	26
27	0.0182 9186	0.0169 5228	0.0156 9717	0.0145 2288	27
28	0.0171 2253	0.0158 1440	0.0145 9255	0.0134 5305	28
29	0.0160 4551	0.0147 6857	0.0135 7961	0.0124 7440	29
30	0.0150 5144	0.0138 0539	0.0126 4891	0.0115 7744	30
31	0.0141 3212	0.0129 1665	0.0117 9222	0.0107 5393	31
32	0.0132 8042	0.0120 9519	0.0110 0234	0.0099 9665	32
33	0.0124 9004	0.0113 3469	0.0102 7293	0.0092 9924	33
34	0.0117 5545	0.0106 2958	0.0095 9843	0.0086 5610	34
35	0.0110 7171	0.0099 7493	0.0089 7386	0.0080 6226	35
36	0.0104 3446	0.0093 6635	0.0083 9483	0.0075 1332	36
37	0.0098 3979	0.0087 9993	0.0078 5743	0.0070 0534	37
38	0.0092 8423	0.0082 7217	0.0073 5812	0.0065 3480	38
39	0.0087 6462	0.0077 7991	0.0068 9377	0.0060 9854	39
40	0.0082 7816	0.0073 2034	0.0064 6154	0.0056 9373	40
41	0.0078 2229	0.0068 9090	0.0060 5886	0.0053 1779	41
42	0.0073 9471	0.0064 8927	0.0056 8342	0.0049 6842	42
43	0.0069 9333	0.0061 1337	0.0053 3312	0.0046 4352	43
44	0.0066 1625	0.0057 6128	0.0050 0606	0.0043 4119	44
45	0.0062 6173	0.0054 3127	0.0047 0050	0.0040 5968	45
46	0.0059 2820	0.0051 2175	0.0044 1485	0.0037 9743	46
47	0.0056 1421	0.0048 3129	0.0041 4768	0.0035 5300	47
48	0.0053 1843	0.0045 5854	0.0038 9766	0.0033 2506	48
49	0.0050 3965	0.0043 0230	0.0036 6356	0.0031 1240	49
50	0.0047 7674	0.0040 6145	0.0034 4429	0.0029 1393	50

Annuity Whose Amount at Compound Interest is 1

$$s_{\overline{n|}}^{-1}=i/[(1+i)^n-1]$$

n	5%	5½%	6%	6½%	*n*
51	0.0045 2867	0.0038 3495	0.0032 3880	0.0027 2861	51
52	0.0042 9450	0.0036 2185	0.0030 4617	0.0025 5553	52
53	0.0040 7334	0.0034 2130	0.0028 6551	0.0023 9382	53
54	0.0038 6438	0.0032 3245	0.0026 9602	0.0022 4267	54
55	0.0036 6686	0.0030 5458	0.0025 3696	0.0021 0137	55
56	0.0034 8010	0.0028 8698	0.0023 8765	0.0019 6923	56
57	0.0033 0343	0.0027 2900	0.0022 4744	0.0018 4563	57
58	0.0031 3626	0.0025 8006	0.0021 1574	0.0017 2999	58
59	0.0029 7802	0.0024 3959	0.0019 9200	0.0016 2177	59
60	0.0028 2818	0.0023 0707	0.0018 7572	0.0015 2047	60
61	0.0026 8627	0.0021 8202	0.0017 6642	0.0014 2564	61
62	0.0025 5183	0.0020 6400	0.0016 6366	0.0013 3684	62
63	0.0024 2442	0.0019 5258	0.0015 6704	0.0012 5367	63
64	0.0023 0365	0.0018 4737	0.0014 7615	0.0011 7577	64
65	0.0021 8915	0.0017 4800	0.0013 9066	0.0011 0280	65
66	0.0020 8057	0.0016 5413	0.0013 1022	0.0010 3442	66
67	0.0019 7757	0.0015 6544	0.0012 3454	0.0009 7034	67
68	0.0018 7986	0.0014 8163	0.0011 6330	0.0009 1029	68
69	0.0017 8715	0.0014 0242	0.0010 9625	0.0008 5400	69
70	0.0016 9915	0.0013 2754	0.0010 3313	0.0008 0124	70
71	0.0016 1563	0.0012 5675	0.0009 7370	0.0007 5177	71
72	0.0015 3633	0.0011 8982	0.0009 1774	0.0007 0539	72
73	0.0014 6103	0.0011 2652	0.0008 6505	0.0006 6190	73
74	0.0013 8953	0.0010 6665	0.0008 1542	0.0006 2112	74
75	0.0013 2161	0.0010 1002	0.0007 6867	0.0005 8287	75
76	0.0012 5709	0.0009 5645	0.0007 2463	0.0005 4699	76
77	0.0011 9580	0.0009 0577	0.0006 8315	0.0005 1335	77
78	0.0011 3756	0.0008 5781	0.0006 4407	0.0004 8178	78
79	0.0010 8222	0.0008 1243	0.0006 0724	0.0004 5217	79
80	0.0010 2962	0.0007 6948	0.0005 7254	0.0004 2440	80
81	0.0009 7963	0.0007 2884	0.0005 3984	0.0003 9834	81
82	0.0009 3211	0.0006 9036	0.0005 0903	0.0003 7388	82
83	0.0008 8694	0.0006 5395	0.0004 7998	0.0003 5094	83
84	0.0008 4399	0.0006 1947	0.0004 5261	0.0003 2941	84
85	0.0008 0316	0.0005 8683	0.0004 2681	0.0003 0921	85
86	0.0007 6433	0.0005 5593	0.0004 0249	0.0002 9026	86
87	0.0007 2740	0.0005 2667	0.0003 7956	0.0002 7247	87
88	0.0006 9228	0.0004 9896	0.0003 5795	0.0002 5577	88
89	0.0006 5888	0.0004 7273	0.0003 3757	0.0002 4010	89
90	0.0006 2711	0.0004 4788	0.0003 1836	0.0002 2540	90
91	0.0005 9689	0.0004 2435	0.0003 0025	0.0002 1160	91
92	0.0005 6815	0.0004 0207	0.0002 8318	0.0001 9864	92
93	0.0005 4080	0.0003 8096	0.0002 6708	0.0001 8649	93
94	0.0005 1478	0.0003 6097	0.0002 5190	0.0001 7507	94
95	0.0004 9003	0.0003 4204	0.0002 3758	0.0001 6436	95
96	0.0004 6648	0.0003 2410	0.0002 2408	0.0001 5431	96
97	0.0004 4407	0.0003 0711	0.0002 1135	0.0001 4487	97
98	0.0004 2274	0.0002 9101	0.0001 9935	0.0001 3601	98
99	0.0004 0245	0.0002 7577	0.0001 8803	0.0001 2769	99
100	0.0003 8314	0.0002 6132	0.0001 7736	0.0001 1988	100

Annuity Whose Amount at Compound Interest is 1

$$s^{-1}_{\overline{n}|} = i/[(1+i)^n - 1]$$

n	7%	7½%	8%	8½%	*n*
1	1.0000 0000	1.0000 0000	1.0000 0000	1.0000 0000	1
2	0.4830 9179	0.4819 2771	0.4807 6923	0.4796 1631	2
3	0.3110 5166	0.3095 3763	0.3080 3351	0.3065 3925	3
4	0.2252 2812	0.2235 6751	0.2219 2080	0.2202 8789	4
5	0.1738 9069	0.1721 6472	0.1704 5645	0.1687 6575	5
6	0.1397 9580	0.1380 4489	0.1363 1539	0.1346 0708	6
7	0.1155 5322	0.1138 0032	0.1120 7240	0.1103 6922	7
8	0.0974 6776	0.0957 2702	0.0940 1476	0.0923 3065	8
9	0.0834 8647	0.0817 6716	0.0800 7971	0.0784 2372	9
10	0.0723 7750	0.0706 8593	0.0690 2949	0.0674 0771	10
11	0.0633 5690	0.0616 9747	0.0600 7634	0.0584 9293	11
12	0.0559 0199	0.0542 7783	0.0526 9502	0.0511 5286	12
13	0.0496 5085	0.0480 6420	0.0465 2181	0.0450 2287	13
14	0.0443 4494	0.0427 9737	0.0412 9685	0.0398 4244	14
15	0.0397 9462	0.0382 8724	0.0368 2954	0.0354 2046	15
16	0.0358 5765	0.0343 9116	0.0329 7687	0.0316 1354	16
17	0.0324 2519	0.0310 0003	0.0296 2943	0.0283 1198	17
18	0.0294 1260	0.0280 2896	0.0267 0210	0.0254 3041	18
19	0.0267 5301	0.0254 1090	0.0241 2763	0.0229 0140	19
20	0.0243 9293	0.0230 9219	0.0218 5221	0.0206 7097	20
21	0.0222 8900	0.0210 2937	0.0198 3225	0.0186 9541	21
22	0.0204 0577	0.0191 8687	0.0180 3207	0.0169 3892	22
23	0.0187 1393	0.0175 3528	0.0164 2217	0.0153 7193	23
24	0.0171 8902	0.0160 5008	0.0149 7796	0.0139 6975	24
25	0.0158 1052	0.0147 1067	0.0136 7878	0.0127 1168	25
26	0.0145 6103	0.0134 9961	0.0125 0713	0.0115 8016	26
27	0.0134 2573	0.0124 0204	0.0114 4809	0.0105 6025	27
28	0.0123 9193	0.0114 0520	0.0104 8891	0.0096 3914	28
29	0.0114 4865	0.0104 9811	0.0096 1854	0.0088 0577	29
30	0.0105 8640	0.0096 7124	0.0088 2743	0.0080 5058	30
31	0.0097 9691	0.0089 1628	0.0081 0728	0.0073 6524	31
32	0.0090 7292	0.0082 2599	0.0074 5081	0.0067 4247	32
33	0.0084 0807	0.0075 9397	0.0068 5163	0.0061 7588	33
34	0.0077 9674	0.0070 1461	0.0063 0411	0.0056 5984	34
35	0.0072 3396	0.0064 8291	0.0058 0326	0.0051 8937	35
36	0.0067 1531	0.0059 9447	0.0053 4467	0.0047 6006	36
37	0.0062 3685	0.0055 4533	0.0049 2440	0.0043 6799	37
38	0.0057 9505	0.0051 3197	0.0045 3894	0.0040 0966	38
39	0.0053 8676	0.0047 5124	0.0041 8513	0.0036 8193	39
40	0.0050 0914	0.0044 0031	0.0038 6016	0.0033 8201	40
41	0.0046 5962	0.0040 7663	0.0035 6149	0.0031 0737	41
42	0.0043 3591	0.0037 7789	0.0032 8684	0.0028 5576	42
43	0.0040 3590	0.0035 0201	0.0030 3414	0.0026 2512	43
44	0.0037 5769	0.0032 4710	0.0028 0152	0.0024 1363	44
45	0.0034 9957	0.0030 1146	0.0025 8728	0.0022 1961	45
46	0.0032 5996	0.0027 9353	0.0023 8991	0.0020 4154	46
47	0.0030 3744	0.0025 9190	0.0022 0799	0.0018 7807	47
48	0.0028 3070	0.0024 0527	0.0020 4027	0.0017 2795	48
49	0.0026 3853	0.0022 3247	0.0018 8557	0.0015 9005	49
50	0.0024 5985	0.0020 7241	0.0017 4286	0.0014 6334	50

Annuity Whose Amount at Compound Interest is 1

$$s_{\overline{n|}}^{-1} = i/[(1+i)^n - 1]$$

n	7%	7½%	8%	8½%	*n*
51	0.0022 9365	0.0019 2411	0.0016 1116	0.0013 4688	51
52	0.0021 3901	0.0017 8668	0.0014 8959	0.0012 3983	52
53	0.0019 9509	0.0016 5927	0.0013 7735	0.0011 4139	53
54	0.0018 6110	0.0015 4112	0.0012 7370	0.0010 5087	54
55	0.0017 3633	0.0014 3155	0.0011 7796	0.0009 6761	55
56	0.0016 2011	0.0013 2991	0.0010 8952	0.0008 9101	56
57	0.0015 1183	0.0012 3559	0.0010 0780	0.0008 2053	57
58	0.0014 1093	0.0011 4807	0.0009 3227	0.0007 5568	58
59	0.0013 1689	0.0010 6683	0.0008 6247	0.0006 9599	59
60	0.0012 2923	0.0009 9142	0.0007 9795	0.0006 4106	60
61	0.0011 4749	0.0009 2140	0.0007 3830	0.0005 9049	61
62	0.0010 7127	0.0008 5638	0.0006 8314	0.0005 4393	62
63	0.0010 0019	0.0007 9600	0.0006 3214	0.0005 0107	63
64	0.0009 3388	0.0007 3992	0.0005 8497	0.0004 6160	64
65	0.0008 7203	0.0006 8782	0.0005 4135	0.0004 2526	65
66	0.0008 1431	0.0006 3942	0.0005 0100	0.0003 9179	66
67	0.0007 6046	0.0005 9446	0.0004 6367	0.0003 6097	67
68	0.0007 1021	0.0005 5268	0.0004 2914	0.0003 3258	68
69	0.0006 6331	0.0005 1386	0.0003 9719	0.0003 0643	69
70	0.0006 1953	0.0004 7778	0.0003 6764	0.0002 8234	70
71	0.0005 7866	0.0004 4425	0.0003 4029	0.0002 6016	71
72	0.0005 4051	0.0004 1308	0.0003 1498	0.0002 3972	72
73	0.0005 0490	0.0003 8412	0.0002 9157	0.0002 2089	73
74	0.0004 7164	0.0003 5719	0.0002 6989	0.0002 0354	74
75	0.0004 4060	0.0003 3216	0.0002 4984	0.0001 8756	75
76	0.0004 1160	0.0003 0889	0.0002 3128	0.0001 7284	76
77	0.0003 8453	0.0002 8726	0.0002 1410	0.0001 5927	77
78	0.0003 5924	0.0002 6714	0.0001 9820	0.0001 4677	78
79	0.0003 3563	0.0002 4844	0.0001 8349	0.0001 3526	79
80	0.0003 1357	0.0002 3106	0.0001 6987	0.0001 2465	80
81	0.0002 9297	0.0002 1489	0.0001 5726	0.0001 1487	81
82	0.0002 7373	0.0001 9986	0.0001 4559	0.0001 0586	82
83	0.0002 5576	0.0001 8588	0.0001 3479	0.0000 9756	83
84	0.0002 3897	0.0001 7288	0.0001 2479	0.0000 8990	84
85	0.0002 2329	0.0001 6079	0.0001 1553	0.0000 8285	85
86	0.0002 0863	0.0001 4955	0.0001 0696	0.0000 7636	86
87	0.0001 9495	0.0001 3910	0.0000 9903	0.0000 7037	87
88	0.0001 8216	0.0001 2938	0.0000 9168	0.0000 6485	88
89	0.0001 7021	0.0001 2034	0.0000 8489	0.0000 5977	89
90	0.0001 5905	0.0001 1193	0.0000 7859	0.0000 5508	90
91	0.0001 4863	0.0001 0411	0.0000 7277	0.0000 5077	91
92	0.0001 3888	0.0000 9684	0.0000 6737	0.0000 4679	92
93	0.0001 2978	0.0000 9007	0.0000 6238	0.0000 4312	93
94	0.0001 2128	0.0000 8378	0.0000 5775	0.0000 3974	94
95	0.0001 1333	0.0000 7793	0.0000 5347	0.0000 3663	95
96	0.0001 0590	0.0000 7249	0.0000 4951	0.0000 3375	96
97	0.0000 9897	0.0000 6743	0.0000 4584	0.0000 3111	97
98	0.0000 9248	0.0000 6272	0.0000 4244	0.0000 2867	98
99	0.0000 8643	0.0000 5834	0.0000 3930	0.0000 2642	99
100	0.0000 8076	0.0000 5427	0.0000 3638	0.0000 2435	100

Michigan Males: 1910

x	$.01q_x$	x	$.01q_x$	x	$.01q_x$
10	.280	45	.979	80	12.500
11	.203	46	1.083	81	15.222
12	.212	47	1.014	82	15.011
13	.306	48	1.146	83	18.798
14	.251	49	1.117	84	18.482
15	.269	50	1.159	85	20.180
16	.296	51	1.106	86	23.913
17	.349	52	1.345	87	21.212
18	.456	53	1.625	88	23.188
19	.552	54	1.441	89	23.659
20	.449	55	1.890	90	25.632
21	.556	56	1.779	91	32.184
22	.629	57	1.835	92	27.027
23	.516	58	1.957	93	27.381
24	.503	59	1.957	94	40.000
25	.544	60	2.442	95	32.500
26	.584	61	2.911	96	41.617
27	.627	62	2.799	97	40.000
28	.574	63	3.255	98	38.462
29	.599	64	3.472	99	45.455
30	.515	65	3.576	100	20.000
31	.603	66	3.823	101	30.000
32	.547	67	4.418	102	100.000
33	.586	68	4.722		
34	.627	69	5.335		
35	.722	70	5.502		
36	.679	71	6.596		
37	.688	72	6.423		
38	.613	73	8.278		
39	.692	74	8.262		
40	.691	75	9.026		
41	.717	76	10.206		
42	.735	77	12.243		
43	.821	78	9.831		
44	.971	79	12.823		

American Experience Mortality Table

x	l_x	d_x	q_x	x	l_x	d_x	q_x
10	100 000	749	.007 490	55	64 563	1 199	.018 571
11	99 251	746	.007 516	56	63 364	1 260	.019 885
12	98 505	743	.007 543	57	62 104	1 325	.021 335
13	97 762	740	.007 569	58	60 779	1 394	.022 936
14	97 022	737	.007 596	59	59 385	1 468	.024 720
15	96 285	735	.007 634	60	57 917	1 546	.026 693
16	95 550	732	.007 661	61	56 371	1 628	.028 880
17	94 818	729	.007 688	62	54 743	1 713	.031 292
18	94 089	727	.007 727	63	53 030	1 800	.033 943
19	93 362	725	.007 765	64	51 230	1 889	.036 873
20	92 637	723	.007 805	65	49 341	1 980	.040 129
21	91 914	722	.007 855	66	47 361	2 070	.043 707
22	91 192	721	.007 906	67	45 291	2 158	.047 647
23	90 471	720	.007 958	68	43 133	2 243	.052 002
24	89 751	719	.008 011	69	40 890	2 321	.056 762
25	89 032	718	.008 065	70	38 569	2 391	.061 993
26	88 314	718	.008 130	71	36 178	2 448	.067 665
27	87 596	718	.008 197	72	33 730	2 487	.073 733
28	86 878	718	.008 264	73	31 243	2 505	.080 178
29	86 160	719	.008 345	74	28 738	2 501	.087 028
30	85 441	720	.008 427	75	26 237	2 476	.094 371
31	84 721	721	.008 510	76	23 761	2 431	.102 311
32	84 000	723	.008 607	77	21 330	2 369	.111 064
33	83 277	726	.008 718	78	18 961	2 291	.120 827
34	82 551	729	.008 831	79	16 670	2 196	.131 734
35	81 822	732	.008 946	80	14 474	2 091	.144 466
36	81 090	737	.009 089	81	12 383	1 964	.158 605
37	80 353	742	.009 234	82	10 419	1 816	.174 297
38	79 611	749	.009 408	83	8 603	1 648	.191 561
39	78 862	756	.009 586	84	6 955	1 470	.211 359
40	78 106	765	.009 794	85	5 485	1 292	.235 552
41	77 341	774	.010 008	86	4 193	1 114	.265 681
42	76 567	785	.010 252	87	3 079	933	.303 020
43	75 782	797	.010 517	88	2 146	744	.346 692
44	74 985	812	.010 829	89	1 402	555	.395 863
45	74 173	828	.011 163	90	847	385	.454 545
46	73 345	848	.011 562	91	462	246	.532 468
47	72 497	870	.012 000	92	216	137	.634 259
48	71 627	896	.012 509	93	79	58	.734 177
49	70 731	927	.013 106	94	21	18	.857 143
50	69 804	962	.013 781	95	3	3	1.000 000
51	68 842	1 001	.014 541				
52	67 841	1 044	.015 389				
53	66 797	1 091	.016 333				
54	65 706	1 143	.017 396				

Valuation Columns

3 %

American
Experience

x	D_x	C_x	N_x	M_x
10	74409.4	541.094	1811346.	21651.7
11	71701.0	523.229	1736936.	21110.7
12	69089.4	505.947	1665235.	20587.4
13	66571.2	489.227	1596146.	20081.5
14	64143.0	473.052	1529575.	19592.3
15	61801.7	458.028	1465432.	19119.2
16	59543.6	442.872	1403630.	18661.2
17	57366.4	428.211	1344086.	18218.3
18	55267.4	414.598	1286720.	17790.1
19	53243.0	401.415	1231453.	17375.5
20	51290.9	388.648	1178210.	16974.1
21	49408.3	376.806	1126919.	16585.4
22	47592.4	365.325	1077510.	16208.6
23	45840.9	354.192	1029918.	15843.3
24	44151.5	343.398	984077.	15489.1
25	42522.2	332.933	939926.	15145.7
26	40950.7	323.236	897403.	14812.8
27	39434.8	313.821	856453.	14489.5
28	37972.4	304.681	817018.	14175.7
29	36561.7	296.218	779046.	13871.0
30	35200.6	287.991	742484.	13574.8
31	33887.3	279.991	707283.	13286.8
32	32620.3	272.590	673396.	13006.8
33	31397.6	265.749	640776.	12734.2
34	30217.4	259.074	609378.	12468.5
35	29078.2	252.564	579161.	12209.4
36	27978.7	246.882	550082.	11956.9
37	26916.9	241.318	522104.	11710.0
38	25891.6	236.499	495187.	11468.7
39	24901.0	231.757	469295.	11232.2
40	23943.9	227.685	444394.	11000.4
41	23018.8	223.654	420450.	10772.7
42	22124.7	220.226	397432.	10549.1
43	21260.1	217.080	375307.	10328.8
44	20423.8	214.724	354047.	10111.8
45	19614.2	212.578	333623.	9897.03
46	18830.3	211.371	314009.	9684.45
47	18070.5	210.539	295178.	9473.08
48	17333.6	210.515	277108.	9262.54
49	16618.3	211.455	259774.	9052.03
50	15922.8	213.048	243156.	8840.57
51	15246.0	215.228	227233.	8627.53
52	14586.7	217.935	211987.	8412.30
53	13943.9	221.113	197401.	8194.36
54	13316.6	224.905	183457.	7973.25

Valuation Columns

American Experience

3%

x	D_x	C_x	N_x	M_x
55	12703.9	229.052	170140.	7748.34
56	12104.8	233.695	157436.	7519.29
57	11518.5	238.593	145331.	7285.60
58	10944.5	243.706	133813.	7047.00
59	10382.0	249.168	122868.	6803.30
60	9830.43	254.764	112486.	6554.13
61	9289.34	260.463	102656.	6299.37
62	8758.32	266.080	93366.6	6038.90
63	8237.14	271.450	84608.2	5772.82
64	7725.77	276.575	76371.1	5501.37
65	7224.18	281.455	68645.3	5224.80
66	6732.31	285.678	61421.2	4943.34
67	6250.54	289.148	54688.8	4657.67
68	5779.34	291.784	48438.3	4368.52
69	5319.23	293.136	42659.0	4076.73
70	4871.16	293.182	37339.7	3783.60
71	4436.10	291.428	32468.6	3490.42
72	4015.47	287.447	28032.5	3198.99
73	3611.07	281.095	24017.0	2911.54
74	3224.79	272.472	20405.9	2630.45
75	2858.40	261.892	17181.1	2357.97
76	2513.25	249.643	14322.7	2096.08
77	2190.41	236.190	11809.5	1846.44
78	1890.42	221.761	9619.09	1610.25
79	1613.60	206.374	7728.67	1388.49
80	1360.22	190.783	6115.07	1182.12
81	1129.82	173.976	4754.85	991.333
82	922.940	156.180	3625.02	817.357
83	739.878	137.604	2702.08	661.177
84	580.725	119.166	1962.21	523.573
85	444.644	101.686	1381.48	404.407
86	330.007	85.1229	936.837	302.721
87	235.272	69.2159	606.829	217.598
88	159.204	53.5871	371.557	148.382
89	100.980	38.8099	212.353	94.7949
90	59.2288	26.1381	111.373	55.9850
91	31.3657	16.2148	52.1442	29.8469
92	14.2373	8.76715	20.7785	13.6321
93	5.05551	3.60354	6.54120	4.86499
94	1.30473	1.08577	1.48569	1.26146
95	.180961	.175690	.180961	.175690

N.	Log.	N.	Log.	N.	Log.	N.	Log.	N.	Log.
0	— ∞	50	698 9700	100	000 0000	150	176 0913	200	301 0300
1	000 0000	51	707 5702	101	004 3214	151	178 9769	201	303 1961
2	301 0300	52	716 0033	102	008 6002	152	181 8436	202	305 3514
3	477 1213	53	724 2759	103	012 8372	153	184 6914	203	307 4960
4	602 0600	54	732 3938	104	017 0333	154	187 5207	204	309 6302
5	698 9700	55	740 3627	105	021 1893	155	190 3317	205	311 7539
6	778 1513	56	748 1880	106	025 3059	156	193 1246	206	313 8672
7	845 0980	57	755 8749	107	029 3838	157	195 8997	207	315 9703
8	903 0900	58	763 4280	108	033 4238	158	198 6571	208	318 0633
9	954 2425	59	770 8520	109	037 4265	159	201 3971	209	320 1463
10	000 0000	60	778 1513	110	041 3927	160	204 1200	210	322 2193
11	041 3927	61	785 3298	111	045 3230	161	206 8259	211	324 2825
12	079 1812	62	792 3917	112	049 2180	162	209 5150	212	326 3359
13	113 9434	63	799 3405	113	053 0784	163	212 1876	213	328 3796
14	146 1280	64	806 1800	114	056 9049	164	214 8438	214	330 4138
15	176 0913	65	812 9134	115	060 6978	165	217 4839	215	332 4385
16	204 1200	66	819 5439	116	064 4580	166	220 1081	216	334 4538
17	230 4489	67	826 0748	117	068 1859	167	222 7165	217	336 4597
18	255 2725	68	832 5089	118	071 8820	168	225 3093	218	338 4565
19	278 7536	69	838 8491	119	075 5470	169	227 8867	219	340 4441
20	301 0300	70	845 0980	120	079 1812	170	230 4489	220	342 4227
21	322 2193	71	851 2583	121	082 7854	171	232 9961	221	344 3923
22	342 4227	72	857 3325	122	086 3598	172	235 5284	222	346 3530
23	361 7278	73	863 3229	123	089 9051	173	238 0461	223	348 3049
24	380 2112	74	869 2317	124	093 4217	174	240 5492	224	350 2480
25	397 9400	75	875 0613	125	096 9100	175	243 0380	225	352 1825
26	414 9733	76	880 8136	126	100 3705	176	245 5127	226	354 1084
27	431 3638	77	886 4907	127	103 8037	177	247 9733	227	356 0259
28	447 1580	78	892 0946	128	107 2100	178	250 4200	228	357 9348
29	462 3980	79	897 6271	129	110 5897	179	252 8530	229	359 8355
30	477 1213	80	903 0900	130	113 9434	180	255 2725	230	361 7278
31	491 3617	81	908 4850	131	117 2713	181	257 6786	231	363 6120
32	505 1500	82	913 8139	132	120 5739	182	260 0714	232	365 4880
33	518 5139	83	919 0781	133	123 8516	183	262 4511	233	367 3559
34	531 4789	84	924 2793	134	127 1048	184	264 8178	234	369 2159
35	544 0680	85	929 4189	135	130 3338	185	267 1717	235	371 0679
36	556 3025	86	934 4985	136	133 5389	186	269 5129	236	372 9120
37	568 2017	87	939 5193	137	136 7206	187	271 8416	237	374 7483
38	579 7836	88	944 4827	138	139 8791	188	274 1578	238	376 5770
39	591 0646	89	949 3900	139	143 0148	189	276 4618	239	378 3979
40	602 0600	90	954 2425	140	146 1280	190	278 7536	240	380 2112
41	612 7839	91	959 0414	141	149 2191	191	281 0334	241	382 0170
42	623 2493	92	963 7878	142	152 2883	192	283 3012	242	383 8154
43	633 4685	93	968 4829	143	155 3360	193	285 5573	243	385 6063
44	643 4527	94	973 1279	144	158 3625	194	287 8017	244	387 3898
45	653 2125	95	977 7236	145	161 3680	195	290 0346	245	389 1661
46	662 7578	96	982 2712	146	164 3529	196	292 2561	246	390 9351
47	672 0979	97	986 7717	147	167 3173	197	294 4662	247	392 6970
48	681 2412	98	991 2261	148	170 2617	198	296 6652	248	394 4517
49	690 1961	99	995 6352	149	173 1863	199	298 8531	249	396 1993
50	698 9700	100	000 0000	150	176 0913	200	301 0300	250	397 9400
N.	Log.	N.	Log.	N.	Log.	N.	Log.	N.	Log.

N.	Log.	N.	Log.	N.	Log.	N.	Log.	N.	Log.
250	397 9400	300	477 1213	350	544 0680	400	602 0600	450	653 2125
251	399 6737	301	478 5665	351	545 3071	401	603 1444	451	654 1765
252	401 4005	302	480 0069	352	546 5427	402	604 2261	452	655 1384
253	403 1205	303	481 4426	353	547 7747	403	605 3050	453	656 0982
254	404 8337	304	482 8736	354	549 0033	404	606 3814	454	657 0559
255	406 5402	305	484 2998	355	550 2284	405	607 4550	455	658 0114
256	408 2400	306	485 7214	356	551 4500	406	608 5260	456	658 9648
257	409 9331	307	487 1384	357	552 6682	407	609 5944	457	659 9162
258	411 6197	308	488 5507	358	553 8830	408	610 6602	458	660 8655
259	413 2998	309	489 9585	359	555 0944	409	611 7233	459	661 8127
260	414 9733	310	491 3617	360	556 3025	410	612 7839	460	662 7578
261	416 6405	311	492 7604	361	557 5072	411	613 8418	461	663 7009
262	418 3013	312	494 1546	362	558 7086	412	614 8972	462	664 6420
263	419 9557	313	495 5443	363	559 9066	413	615 9501	463	665 5810
264	421 6039	314	496 9296	364	561 1014	414	617 0003	464	666 5180
265	423 2459	315	498 3106	365	562 2929	415	618 0481	465	667 4530
266	424 8816	316	499 6871	366	563 4811	416	619 0933	466	668 3859
267	426 5113	317	501 0593	367	564 6661	417	620 1361	467	669 3169
268	428 1348	318	502 4271	368	565 8478	418	621 1763	468	670 2459
269	429 7523	319	503 7907	369	567 0264	419	622 2140	469	671 1728
270	431 3638	320	505 1500	370	568 2017	420	623 2493	470	672 0979
271	432 9693	321	506 5050	371	569 3739	421	624 2821	471	673 0209
272	434 5689	322	507 8559	372	570 5429	422	625 3125	472	673 9420
273	436 1626	323	509 2025	373	571 7088	423	626 3404	473	674 8611
274	437 7506	324	510 5450	374	572 8716	424	627 3659	474	675 7783
275	439 3327	325	511 8834	375	574 0313	425	628 3889	475	676 6936
276	440 9091	326	513 2176	376	575 1878	426	629 4096	476	677 6070
277	442 4798	327	514 5478	377	576 3414	427	630 4279	477	678 5184
278	444 0448	328	515 8738	378	577 4918	428	631 4438	478	679 4279
279	445 6042	329	517 1959	379	578 6392	429	632 4573	479	680 3355
280	447 1580	330	518 5139	380	579 7836	430	633 4685	480	681 2412
281	448 7063	331	519 8280	381	580 9250	431	634 4773	481	682 1451
282	450 2491	332	521 1381	382	582 0634	432	635 4837	482	683 0470
283	451 7864	333	522 4442	383	583 1988	433	636 4879	483	683 9471
284	453 3183	334	523 7465	384	584 3312	434	637 4897	484	684 8454
285	454 8449	335	525 0448	385	585 4607	435	638 4893	485	685 7417
286	456 3660	336	526 3393	386	586 5873	436	639 4865	486	686 6363
287	457 8819	337	527 6299	387	587 7110	437	640 4814	487	687 5290
288	459 3925	338	528 9167	388	588 8317	438	641 4741	488	688 4198
289	460 8978	339	530 1997	389	589 9496	439	642 4645	489	689 3089
290	462 3980	340	531 4789	390	591 0646	440	643 4527	490	690 1961
291	463 8930	341	532 7544	391	592 1768	441	644 4386	491	691 0815
292	465 3829	342	534 0261	392	593 2861	442	645 4223	492	691 9651
293	466 8676	343	535 2941	393	594 3926	443	646 4037	493	692 8469
294	468 3473	344	536 5584	394	595 4962	444	647 3830	494	693 7269
295	469 8220	345	537 8191	395	596 5971	445	648 3600	495	694 6052
296	471 2917	346	539 0761	396	597 6952	446	649 3349	496	695 4817
297	472 7564	347	540 3295	397	598 7905	447	650 3075	497	696 3564
298	474 2163	348	541 5792	398	599 8831	448	651 2780	498	697 2293
299	475 6712	349	542 8254	399	600 9729	449	652 2463	499	698 1005
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501	699 8377	551	741 1516	601	778 8745	651	813 5810	701	845 7180
502	700 7037	552	741 9391	602	779 5965	652	814 2476	702	846 3371
503	701 5680	553	742 7251	603	780 3173	653	814 9132	703	846 9553
504	702 4305	554	743 5098	604	781 0369	654	815 5777	704	847 5727
505	703 2914	555	744 2930	605	781 7554	655	816 2413	705	848 1891
506	704 1505	556	745 0748	606	782 4726	656	816 9038	706	848 8047
507	705 0080	557	745 8552	607	783 1887	657	817 5654	707	849 4194
508	705 8637	558	746 6342	608	783 9036	658	818 2259	708	850 0333
509	706 7178	559	747 4118	609	784 6173	659	818 8854	709	850 6462
510	707 5702	560	748 1880	610	785 3298	660	819 5439	710	851 2583
511	708 4209	561	748 9629	611	786 0412	661	820 2015	711	851 8696
512	709 2700	562	749 7363	612	786 7514	662	820 8580	712	852 4800
513	710 1174	563	750 5084	613	787 4605	663	821 5135	713	853 0895
514	710 9631	564	751 2791	614	788 1684	664	822 1681	714	853 6982
515	711 8072	565	752 0484	615	788 8751	665	822 8216	715	854 3060
516	712 6497	566	752 8164	616	789 5807	666	823 4742	716	854 9130
517	713 4905	567	753 5831	617	790 2852	667	824 1258	717	855 5192
518	714 3298	568	754 3483	618	790 9885	668	824 7765	718	856 1244
519	715 1674	569	755 1123	619	791 6906	669	825 4261	719	856 7289
520	716 0033	570	755 8749	620	792 3917	670	826 0748	720	857 3325
521	716 8377	571	756 6361	621	793 0916	671	826 7225	721	857 9353
522	717 6705	572	757 3960	622	793 7904	672	827 3693	722	858 5372
523	718 5017	573	758 1546	623	794 4880	673	828 0151	723	859 1383
524	719 3313	574	758 9119	624	795 1846	674	828 6599	724	859 7386
525	720 1593	575	759 6678	625	795 8800	675	829 3038	725	860 3380
526	720 9857	576	760 4225	626	796 5743	676	829 9467	726	860 9366
527	721 8106	577	761 1758	627	797 2675	677	830 5887	727	861 5344
528	722 6339	578	761 9278	628	797 9596	678	831 2297	728	862 1314
529	723 4557	579	762 6786	629	798 6506	679	831 8698	729	862 7275
530	724 2759	580	763 4280	630	799 3405	680	832 5089	730	863 3229
531	725 0945	581	764 1761	631	800 0294	681	833 1471	731	863 9174
532	725 9116	582	764 9230	632	800 7171	682	833 7844	732	864 5111
533	726 7272	583	765 6686	633	801 4037	683	834 4207	733	865 1040
534	727 5413	584	766 4128	634	802 0893	684	835 0561	734	865 6961
535	728 3538	585	767 1559	635	802 7737	685	835 6906	735	866 2873
536	729 1648	586	767 8976	636	803 4571	686	836 3241	736	866 8778
537	729 9743	587	768 6381	637	804 1394	687	836 9567	737	867 4675
538	730 7823	588	769 3773	638	804 8207	688	837 5884	738	868 0564
539	731 5888	589	770 1153	639	805 5009	689	838 2192	739	868 6444
540	732 3938	590	770 8520	640	806 1800	690	838 8491	740	869 2317
541	733 1973	591	771 5875	641	806 8580	691	839 4780	741	869 8182
542	733 9993	592	772 3217	642	807 5350	692	840 1061	742	870 4039
543	734 7998	593	773 0547	643	808 2110	693	840 7332	743	870 9888
544	735 5989	594	773 7864	644	808 8859	694	841 3595	744	871 5729
545	736 3965	595	774 5170	645	809 5597	695	841 9848	745	872 1563
546	737 1926	596	775 2463	646	810 2325	696	842 6092	746	872 7388
547	737 9873	597	775 9743	647	810 9043	697	843 2328	747	873 3206
548	738 7806	598	776 7012	648	811 5750	698	843 8554	748	873 9016
549	739 5723	599	777 4268	649	812 2447	699	844 4772	749	874 4818
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751	875 6399	801	903 6325	851	929 9296	901	954 7248	951	978 1805
752	876 2178	802	904 1744	852	930 4396	902	955 2065	952	978 6369
753	876 7950	803	904 7155	853	930 9490	903	955 6878	953	979 0929
754	877 3713	804	905 2560	854	931 4579	904	956 1684	954	979 5484
755	877 9470	805	905 7959	855	931 9661	905	956 6486	955	980 0034
756	878 5218	806	906 3350	856	932 4738	906	957 1282	956	980 4579
757	879 0959	807	906 8735	857	932 9808	907	957 6073	957	980 9119
758	879 6692	808	907 4114	858	933 4873	908	958 0858	958	981 3655
759	880 2418	809	907 9485	859	933 9932	909	958 5639	959	981 8186
760	880 8136	810	908 4850	860	934 4985̄	910	959 0414	960	982 2712
761	881 3847	811	909 0209	861	935 0032	911	959 5184	961	982 7234
762	881 9550	812	909 5560	862	935 5073	912	959 9948	962	983 1751
763	882 5245	813	910 0905	863	936 0108	913	960 4708	963	983 6263
764	883 0934	814	910 6244	864	936 5137	914	960 9462	964	984 0770
765	883 6614	815	911 1576	865	937 0161	915	961 4211	965	984 5273
766	884 2288	816	911 6902	866	937 5179	916	961 8955̄	966	984 9771
767	884 7954	817	912 2221	867	938 0191	917	962 3693	967	985 4265̄
768	885 3612	818	912 7533	868	938 5197	918	962 8427	968	985 8754
769	885 9263	819	913 2839	869	939 0198	919	963 3155	969	986 3238
770	886 4907	820	913 8139	870	939 5193	920	963 7878	970	986 7717
771	887 0544	821	914 3432	871	940 0182	921	964 2596	971	987 2192
772	887 6173	822	914 8718	872	940 5165̄	922	964 7309	972	987 6663
773	888 1795̄	823	915 3998	873	941 0142	923	965 2017	973	988 1128
774	888 7410	824	915 9272	874	941 5114	924	965 6720	974	988 5590
775	889 3017	825	916 4539	875	942 0081	925	966 1417	975	989 0046
776	889 8617	826	916 9800	876	942 5041	926	966 6110	976	989 4498
777	890 4210	827	917 5055	877	942 9996	927	967 0797	977	989 8946
778	890 9796	828	918 0303	878	943 4945	928	967 5480	978	990 3389
779	891 5375̄	829	918 5545	879	943 9889	929	968 0157	979	990 7827
780	892 0946	830	919 0781	880	944 4827	930	968 4829	980	991 2261
781	892 6510	831	919 6010	881	944 9759	931	968 9497	981	991 6690
782	893 2068	832	920 1233	882	945 4686	932	969 4159	982	992 1115̄
783	893 7618	833	920 6450	883	945 9607	933	969 8816	983	992 5535
784	894 3161	834	921 1661	884	946 4523	934	970 3469	984	992 9951
785	894 8697	835	921 6865̄	885	946 9433	935	970 8116	985	993 4362
786	895 4225	836	922 2063	886	947 4337	936	971 2758	986	993 8769
787	895 9747	837	922 7255̄	887	947 9236	937	971 7396	987	994 3172
788	896 5262	838	923 2440	888	948 4130	938	972 2028	988	994 7569
789	897 0770	839	923 7620	889	948 9018	939	972 6656	989	995 1963
790	897 6271	840	924 2793	890	949 3900	940	973 1279	990	995 6352
791	898 1765̄	841	924 7960	891	949 8777	941	973 5896	991	996 0737
792	898 7252	842	925 3121	892	950 3649	942	974 0509	992	996 5117
793	899 2732	843	925 8276	893	950 8515̄	943	974 5117	993	996 9492
794	899 8205	844	926 3424	894	951 3375	944	974 9720	994	997 3864
795	900 3671	845	926 8567	895	951 8230	945	975 4318	995	997 8231
796	900 9131	846	927 3704	896	952 3080	946	975 8911	996	998 2593
797	901 4583	847	927 8834	897	952 7924	947	976 3500	997	998 6952
798	902 0029	848	928 3959	898	953 2763	948	976 8083	998	999 1305
799	902 5468	849	928 9077	899	953 7597	949	977 2662	999	999 5655̄
800	903 0900	850	929 4189	900	954 2425	950	977 7236	1000	000 0000
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02	8677	9111	9544	9977	0̅411	0̅844	1̅277	1̅710	2̅143	2̅576
03	001 3009	3442	3875	4308	4741	5174	5607	6039	6472	6905̅
04	7337	7770	8202	8635̅	9067	9499	9932	0̅364	0̅796	1̅228
05	002 1661	2093	2525̅	2957	3389	3821	4253	4685̅	5116	5548
06	5980	6411	6843	7275̅	7706	8138	8569	9001	9432	9863
07	003 0295̅	0726	1157	1588	2019	2451	2882	3313	3744	4174
08	4605	5036	5467	5898	6328	6759	7190	7620	8051	8481
09	8912	9342	9772	0̅203	0̅033	1̅063	1̅493	1̅924	2̅354	2̅784
1010	004 3214	3644	4074	4504	4933	5363	5793	6223	6652	7082
11	7512	7941	8371	8800	9229	9659	0̅088	0̅517	0̅947	1̅376
12	005 1805	2234	2663	3092	3521	3950	4379	4808	5237	5666
13	6094	6523	6952	7380	7809	8238	8666	9094	9523	9951
14	006 0380	0808	1236	1664	2092	2521	2949	3377	3805̅	4233
15	4660	5088	5516	5944	6372	6799	7227	7655̅	8082	8510
16	8937	9365̅	9792	0̅219	0̅647	1̅074	1̅501	1̅928	2̅355	2̅782
17	007 3210	3637	4064	4490	4917	5344	5771	6198	6624	7051
18	7478	7904	8331	8757	9184	9610	0̅037	0̅463	0̅889	1̅316
19	008 1742	2168	2594	3020	3446	3872	4298	4724	5150	5576
1020	6002	6427	6853	7279	7704	8130	8556	8981	9407	9832
21	009 0257	0683	1108	1533	1959	2384	2809	3234	3659	4084
22	4509	4934	5359	5784	6208	6633	7058	7483	7907	8332
23	8756	9181	9605	0̅030	0̅454	0̅878	1̅303	1̅727	2̅151	2̅575
24	010 3000	3424	3848	4272	4696	5120	5544	5967	6391	6815̅
25	7239	7662	8086	8510	8933	9357	9780	0̅204	0̅627	1̅050
26	011 1474	1897	2320	2743	3166	3590	4013	4436	4859	5282
27	5704	6127	6550	6973	7396	7818	8241	8664	9086	9509
28	9931	0̅354	0̅776	1̅198	1̅621	2̅043	2̅465	2̅887	3̅310	3̅732
29	012 4154	4576	4998	5420	5842	6264	6685	7107	7529	7951
1030	8372	8794	9215	9637	0̅059	0̅480	0̅901	1̅323	1̅744	2̅165
31	013 2587	3008	3429	3850	4271	4692	5113	5534	5955	6376
32	6797	7218	7639	8059	8480	8901	9321	9742	0̅162	0̅583
33	014 1003	1424	1844	2264	2685̅	3105̅	3525	3945	4365	4785
34	5205	5625	6045	6465	6885	7305̅	7725̅	8144	8564	8984
35	9403	9823	0̅243	0̅662	1̅082	1̅501	1̅920	2̅340	2̅759	3̅178
36	015 3598	4017	4436	4855̅	5274	5693	6112	6531	6950	7369
37	7788	8206	8625	9044	9462	9881	0̅300	0̅718	1̅137	1̅555
38	016 1974	2392	2810	3229	3647	4065	4483	4901	5319	5737
39	6155	6573	6991	7409	7827	8245̅	8663	9080	9498	9916
1040	017 0333	0751	1168	1586	2003	2421	2838	3256	3673	4090
41	4507	4924	5342	5759	6176	6593	7010	7427	7844	8260
42	8677	9094	9511	9927	0̅344	0̅761	1̅177	1̅594	2̅010	2̅427
43	018 2843	3259	3676	4092	4508	4925̅	5341	5757	6173	6589
44	7005̅	7421	7837	8253	8669	9084	9500	9916	0̅332	0̅747
45	019 1163	1578	1994	2410	2825̅	3240	3656	4071	4486	4902
46	5317	5732	6147	6562	6977	7392	7807	8222	8637	9052
47	9467	9882	0̅296	0̅711	1̅126	1̅540	1̅955̅	2̅369	2̅784	3̅198
48	020 3613	4027	4442	4856	5270	5684	6099	6513	6927	7341
49	7755̅	8169	8583	8997	9411	9824	0̅238	0̅652	1̅066	1̅479
1050	021 1893	2307	2720	3134	3547	3961	4374	4787	5201	5614
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P. P.

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6	261.0	260.4	259.8
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2	86.4	86.2	86.0
3	129.6	129.3	129.0
4	172.8	172.4	172.0
5	216.0	215.5	215.0
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7	302 4	301.7	301.0
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3	128.7	128.4	128.1
4	171.6	171.2	170.8
5	214.5	214.0	213.5
6	257.4	256.8	256.2
7	300.3	299.6	298.9
8	343.2	342.4	341.6
9	386.1	385.2	384.3

	426	425	424
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2	85.2	85.0	84.8
3	127.8	127.5	127.2
4	170.4	170.0	169.6
5	213.0	212.5	212.0
6	255.6	255.0	254.4
7	298.2	297.5	296.8
8	340.8	340.0	339.2
9	383.4	382.5	381.6

	423	422	421
1	42.3	42.2	42.1
2	84.6	84.4	84.2
3	126.9	126.6	126.3
4	169.2	168.8	168.4
5	211.5	211.0	210.5
6	253.8	253.2	252.6
7	296.1	295.4	294.7
8	338.4	337.6	336.8
9	380.7	379.8	378.9

	420	419	418
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2	84.0	83.8	83.6
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9	378.0	377.1	376.2

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P. P.

1050 — 1100

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52	022 0157	0570	0983	1396	1808	2221	2634	3046	3459	3871
53	4284	4696	5109	5521	5933	6345	6758	7170	7582	7994
54	8406	8818	9230	9642	0̅054	0̅466	0̅878	1̅289	1̅701	2̅113
55	023 2525̅	2936	3348	3759	4171	4582	4994	5405	5817	6228
56	6639	7050	7462	7873	8284	8695	9106	9517	9928	0̅339
57	024 0750	1161	1572	1982	2393	2804	3214	3625	4036	4446
58	4857	5267	5678	6088	6498	6909	7319	7729	8139	8549
59	8960	9370	9780	0̅190	0̅600	1̅010	1̅419	1̅829	2̅239	2̅649
1060	025 3059	3468	3878	4288	4697	5107	5516	5926	6335	6744
61	7154	7563	7972	8382	8791	9200	9609	0̅018	0̅427	0̅836
62	026 1245	1654	2063	2472	2881	3289	3698	4107	4515	4924
63	5333	5741	6150	6558	6967	7375̅	7783	8192	8600	9008
64	9416	9824	0̅233	0̅641	1̅049	1̅457	1̅865̅	2̅273	2̅680	3̅088
65	027 3496	3904	4312	4719	5127	5535̅	5942	6350	6757	7165̅
66	7572	7979	8387	8794	9201	9609	0̅016	0̅423	0̅830	1̅237
67	028 1644	2051	2458	2865	3272	3679	4086	4492	4899	5306
68	5713	6119	6526	6932	7339	7745	8152	8558	8964	9371
69	9777	0̅183	0̅590	0̅996	1̅402	1̅808	2̅214	2̅620	3̅026	3̅432
1070	029 3838	4244	4649	5055	5461	5867	6272	6678	7084	7489
71	7895̅	8300	8706	9111	9516	9922	0̅327	0̅732	1̅138	1̅543
72	030 1948	2353	2758	3163	3568	3973	4378	4783	5188	5592
73	5997	6402	6807	7211	7616	8020	8425	8830	9234	9638
74	031 0043	0447	0851	1256	1660	2064	2468	2872	3277	3681
75	4085̅	4489	4893	5296	5700	6104	6508	6912	7315	7719
76	8123	8526	8930	9333	9737	0̅140	0̅544	0̅947	1̅350	1̅754
77	032 2157	2560	2963	3367	3770	4173	4576	4979	5382	5785̅
78	6188	6590	6993	7396	7799	8201	8604	9007	9409	9812
79	033 0214	0617	1019	1422	1824	2226	2629	3031	3433	3835
1080	4238	4640	5042	5444	5846	6248	6650	7052	7453	7855
81	8257	8659	9060	9462	9864	0̅265	0̅667	1̅068	1̅470	1̅871
82	034 2273	2674	3075	3477	3878	4279	4680	5081	5482	5884
83	6285̅	6686	7087	7487	7888	8289	8690	9091	9491	9892
84	035 0293	0693	1094	1495̅	1895	2296	2696	3096	3497	3897
85	4297	4698	5098	5498	5898	6298	6698	7098	7498	7898
86	8298	8698	9098	9498	9898	0̅297	0̅697	1̅097	1̅496	1̅896
87	036 2295	2695̅	3094	3494	3893	4293	4692	5091	5491	5890
88	6289	6688	7087	7486	7885	8284	8683	9082	9481	9880
89	037 0279	0678	1076	1475	1874	2272	2671	3070	3468	3867
1090	4265̅	4663	5062	5460	5858	6257	6655̅	7053	7451	7849
91	8248	8646	9044	9442	9839	0̅237	0̅635	1̅033	1̅431	1̅829
92	038 2226	2624	3022	3419	3817	4214	4612	5009	5407	5804
93	6202	6599	6996	7393	7791	8188	8585	8982	9379	9776
94	039 0173	0570	0967	1364	1761	2158	2554	2951	3348	3745̅
95	4141	4538	4934	5331	5727	6124	6520	6917	7313	7709
96	8106	8502	8898	9294	9690	0̅086	0̅482	0̅878	1̅274	1̅670
97	040 2066	2462	2858	3254	3650	4045	4441	4837	5232	5628
98	6023	6419	6814	7210	7605	8001	8396	8791	9187	9582
99	9977	0̅372	0̅767	1̅162	1̅557	1̅952	2̅347	2̅742	3̅137	3̅532
1100	041 3927	4322	4716	5111	5506	5900	6295	6690	7084	7479
N.	0	1	2	3	4	5	6	7	8	9

P. P.

	414	413	412
1	41.4	41.3	41.2
2	82.8	82.6	82.4
3	124.2	123.9	123.6
4	165.6	165.2	164.8
5	207.0	206.5	206.0
6	248.4	247.8	247.2
7	289.8	289.1	288.4
8	331.2	330.4	329.6
9	372.6	371.7	370.8

	411	410	409
1	41.1	41.0	40.9
2	82.2	82.0	81.8
3	123.3	123.0	122.7
4	164.4	164.0	163.6
5	205.5	205.0	204.5
6	246.6	246.0	245.4
7	287.7	287.0	286.3
8	328.8	328.0	327.2
9	369.9	369.0	368.1

	408	407	406
1	40.8	40.7	40.6
2	81.6	81.4	81.2
3	122.4	122.1	121.8
4	163.2	162.8	162.4
5	204.0	203.5	203.0
6	244.8	244.2	243.6
7	285.6	284.9	284.2
8	326.4	325.6	324.8
9	367.2	366.3	365.4

	405	404	403
1	40.5	40.4	40.3
2	81.0	80.8	80.6
3	121.5	121.2	120.9
4	162.0	161.6	161.2
5	202.5	202.0	201.5
6	243.0	242.4	241.8
7	283.5	282.8	282.1
8	324.0	323.2	322.4
9	364.5	363.6	362.7

	402	401	400
1	40.2	40.1	40.0
2	80.4	80.2	80.0
3	120.6	120.3	120.0
4	160.8	160.4	160.0
5	201.0	200.5	200.0
6	241.2	240.6	240.0
7	281.4	280.7	280.0
8	321.6	320.8	320.0
9	361.8	360.9	360.0

	399	398	397
1	39.9	39.8	39.7
2	79.8	79.6	79.4
3	119.7	119.4	119.1
4	159.6	159.2	158.8
5	199.5	199.0	198.5
6	239.4	238.8	238.2
7	279.3	278.6	277.9
8	319.2	318.4	317.6
9	359.1	358.2	357.3

	396	395	394
1	39.6	39.5	39.4
2	79.2	79.0	78.8
3	118.8	118.5	118.2
4	158.4	158.0	157.6
5	198.0	197.5	197.0
6	237.6	237.0	236.4
7	277.2	276.5	275.8
8	316.8	316.0	315.2
9	356.4	355.5	354.6

P. P.

1100 — 1150

N.	0	1	2	3	4	5	6	7	8	9
1100	041 3927	4322	4716	5111	5506	5900	6295	6690	7084	7479
01	7873	8268	8662	9056	9451	9845	0̄239	0̄633	1̄028	1̄422
02	042 1816	2210	2604	2998	3392	3786	4180	4574	4968	5361
03	5755	6149	6543	6936	7330	7723	8117	8510	8904	9297
04	9691	0̄084	0̄477	0̄871	1̄264	1̄657	2̄050	2̄444	2̄837	3̄230
05	043 3623	4016	4409	4802	5195̄	5587	5980	6373	6766	7159
06	7551	7944	8337	8729	9122	9514	9907	0̄299	0̄692	1̄084
07	044 1476	1869	2261	2653	3045	3437	3829	4222	4614	5006
08	5398	5790	6181	6573	6965	7357	7749	8140	8532	8924
09	9315	9707	0̄099	0̄490	0̄882	1̄273	1̄664	2̄056	2̄447	2̄839
1110	045 3230	3621	4012	4403	4795̄	5186	5577	5968	6359	6750
11	7141	7531	7922	8313	8704	9095̄	9485	9876	0̄267	0̄657
12	046 1048	1438	1829	2219	2610	3000	3391	3781	4171	4561
13	4952	5342	5732	6122	6512	6902	7292	7682	8072	8462
14	8852	9242	9632	0̄021	0̄411	0̄801	1̄190	1̄580	1̄970	2̄359
15	047 2749	3138	3528	3917	4306	4696	5085	5474	5864	6253
16	6642	7031	7420	7809	8198	8587	8976	9365	9754	0̄143
17	048 0532	0921	1309	1698	2087	2475	2864	3253	3641	4030
18	4418	4806	5195̄	5583	5972	6360	6748	7136	7525̄	7913
19	8301	8689	9077	9465	9853	0̄241	0̄629	1̄017	1̄405̄	1̄792
1120	049 2180	2568	2956	3343	3731	4119	4506	4894	5281	5669
21	6056	6444	6831	7218	7606	7993	8380	8767	9154	9541
22	9929	0̄316	0̄703	1̄090	1̄477	1̄863	2̄250	2̄637	3̄024	3̄411
23	050 3798	4184	4571	4958	5344	5731	6117	6504	6890	7277
24	7663	8049	8436	8822	9208	9595̄	9981	0̄367	0̄753	1̄139
25	051 1525	1911	2297	2683	3069	3455̄	3841	4227	4612	4998
26	5384	5770	6155	6541	6926	7312	7697	8083	8468	8854
27	9239	9624	0̄010	0̄395	0̄780	1̄166	1̄551	1̄936	2̄321	2̄706
28	052 3091	3476	3861	4246	4631	5016	5400	5785	6170	6555̄
29	6939	7324	7709	8093	8478	8862	9247	9631	0̄016	0̄400
1130	053 0784	1169	1553	1937	2321	2706	3090	3474	3858	4242
31	4626	5010	5394	5778	6162	6546	6929	7313	7697	8081
32	8464	8848	9232	9615	9999	0̄382	0̄766	1̄149	1̄532	1̄916
33	054 2299	2682	3066	3449	3832	4215	4598	4981	5365̄	5748
34	6131	6514	6896	7279	7662	8045	8428	8811	9193	9576
35	9959	0̄341	0̄724	1̄106	1̄489	1̄871	2̄254	2̄636	3̄019	3̄401
36	055 3783	4166	4548	4930	5312	5694	6077	6459	6841	7223
37	7605̄	7987	8369	8750	9132	9514	9896	0̄278	0̄659	1̄041
38	056 1423	1804	2186	2567	2949	3330	3712	4093	4475̄	4856
39	5237	5619	6000	6381	6762	7143	7524	7905	8287	8668
1140	9049	9429	9810	0̄191	0̄572	0̄953	1̄334	1̄714	2̄095	2̄476
41	057 2856	3237	3618	3998	4379	4759	5140	5520	5900	6281
42	6661	7041	7422	7802	8182	8562	8942	9322	9702	0̄082
43	058 0462	0842	1222	1602	1982	2362	2741	3121	3501	3881
44	4260	4640	5019	5399	5778	6158	6537	6917	7296	7676
45	8055̄	8434	8813	9193	9572	9951	0̄330	0̄709	1̄088	1̄467
46	059 1846	2225	2604	2983	3362	3741	4119	4498	4877	5256
47	5634	6013	6391	6770	7148	7527	7905	8284	8662	9041
48	9419	9797	0̄175	0̄554	0̄932	1̄310	1̄688	2̄066	2̄444	2̄822
49	060 3200	3578	3956	4334	4712	5090	5468	5845	6223	6601
1150	6978	7356	7734	8111	8489	8866	9244	9621	9999	0̄376
N.	0	1	2	3	4	5	6	7	8	9

P. P

	395	394	393
1	39.5	39.4	39.3
2	79.0	78.8	78.6
3	118.5	118.2	117.9
4	158.0	157.6	157.2
5	197.5	197.0	196.5
6	237.0	236.4	235.8
7	276.5	275.8	275.1
8	316.0	315.2	314.4
9	355.5	354.6	353.7

	392	391	390
1	39.2	39.1	39.0
2	78.4	78.2	78.0
3	117.6	117.3	117.0
4	156.8	156.4	156.0
5	196.0	195.5	195.0
6	235.2	234.6	234.0
7	274.4	273.7	273.0
8	313.6	312.8	312.0
9	352.8	351.9	351.0

	389	388	387
1	38.9	38.8	38.7
2	77.8	77.6	77.4
3	116.7	116.4	116.1
4	155.6	155.2	154.8
5	194.5	194.0	193.5
6	233.4	232.8	232.2
7	272.3	271.6	270.9
8	311.2	310.4	309.6
9	350.1	349.2	348.3

	386	385	384
1	38.6	38.5	38.4
2	77.2	77.0	76.8
3	115.8	115.5	115.2
4	154.4	154.0	153.6
5	193.0	192.5	192.0
6	231.6	231.0	230.4
7	270.2	269.5	268.8
8	308.8	308.0	307.2
9	347.4	346.5	345.6

	383	382	381
1	38.3	38.2	38.1
2	76.6	76.4	76.2
3	114.9	114.6	114.3
4	153.2	152.8	152.4
5	191.5	191.0	190.5
6	229.8	229.2	228.6
7	268.1	267.4	266.7
8	306.4	305.6	304.8
9	344.7	343.8	342.9

	380	379	378
1	38.0	37.9	37.8
2	76.0	75.8	75.6
3	114.0	113.7	113.4
4	152.0	151.6	151.2
5	190.0	189.5	189.0
6	228.0	227.4	226.8
7	266.0	265.3	264.6
8	304.0	303.2	302.4
9	342.0	341.1	340.2

	377
1	37.7
2	75.4
3	113.1
4	150.8
5	188.5
6	226.2
7	263.9
8	301.6
9	339.3

P. P.

N.	0	1	2	3	4	5	6	7	8	9
1150	060 6978	7356	7734	8111	8489	8866	9244	9621	9999	0̄376
51	061 0753	1131	1508	1885	2262	2639	3017	3394	3771	4148
52	4525̄	4902	5279	5656	6032	6409	6786	7163	7540	7916
53	8293	8670	9046	9423	9799	0̄176	0̄552	0̄929	1̄305	1̄682
54	062 2058	2434	2811	3187	3563	3939	4316	4692	5068	5444
55	5820	6196	6572	6948	7324	7699	8075	8451	8827	9203
56	9578	9954	0̄330	0̄705	1̄081	1̄456	1̄832	2̄207	2̄583	2̄958
57	063 3334	3709	4084	4460	4835̄	5210	5585	5960	6335	6711
58	7086	7461	7836	8211	8585	8960	9335	9710	0̄085̄	0̄460
59	064 0834	1209	1584	1958	2333	2708	3082	3457	3831	4205
1160	4580	4954	5329	5703	6077	6451	6826	7200	7574	7948
61	8322	8696	9070	9444	9818	0̄192	0̄566	0̄940	1̄314	1̄688
62	065 2061	2435	2809	3182	3556	3930	4303	4677	5050	5424
63	5797	6171	6544	6917	7291	7664	8037	8410	8784	9157
64	9530	9903	0̄276	0̄649	1̄022	1̄395̄	1̄768	2̄141	2̄514	2̄886
65	066 3259	3632	4005̄	4377	4750	5123	5495	5868	6241	6613
66	6986	7358	7730	8103	8475	8847	9220	9592	9964	0̄336
67	067 0709	1081	1453	1825̄	2197	2569	2941	3313	3685̄	4057
68	4428	4800	5172	5544	5915	6287	6659	7030	7402	7774
69	8145	8517	8888	9259	9631	0̄002	0̄374	0̄745̄	1̄116	1̄487
1170	068 1859	2230	2601	2972	3343	3714	4085	4456	4827	5198
71	5569	5940	6311	6681	7052	7423	7794	8164	8535̄	8906
72	9276	9647	0̄017	0̄388	0̄758	1̄129	1̄499	1̄869	2̄240	2̄610
73	069 2980	3350	3721	4091	4461	4831	5201	5571	5941	6311
74	6681	7051	7421	7791	8160	8530	8900	9270	9639	0̄009
75	070 0379	0748	1118	1487	1857	2226	2596	2965	3335̄	3704
76	4073	4442	4812	5181	5550	5919	6288	6658	7027	7396
77	7765̄	8134	8503	8871	9240	9609	9978	0̄347	0̄715	1̄084
78	071 1453	1822	2190	2559	2927	3296	3664	4033	4401	4770
79	5138	5506	5875̄	6243	6611	6979	7348	7716	8084	8452
1180	8820	9188	9556	9924	0̄292	0̄660	1̄028	1̄396	1̄763	2̄131
81	072 2499	2867	3234	3602	3970	4337	4705̄	5072	5440	5807
82	6175̄	6542	6910	7277	7644	8011	8379	8746	9113	9480
83	9847	0̄215̄	0̄582	0̄949	1̄316	1̄683	2̄050	2̄416	2̄783	3̄150
84	073 3517	3884	4251	4617	4984	5351	5717	6084	6450	6817
85	7184	7550	7916	8283	8649	9016	9382	9748	0̄114	0̄481
86	074 0847	1213	1579	1945	2311	2677	3043	3409	3775	4141
87	4507	4873	5239	5605̄	5970	6336	6702	7068	7433	7799
88	8164	8530	8895	9261	9626	9992	0̄357	0̄723	1̄088	1̄453
89	075 1819	2184	2549	2914	3279	3644	4010	4375̄	4740	5105̄
1190	5470	5835̄	6199	6564	6929	7294	7659	8024	8388	8753
91	9118	9482	9847	0̄211	0̄576	0̄940	1̄305̄	1̄669	2̄034	2̄398
92	076 2763	3127	3491	3855	4220	4584	4948	5312	5676	6040
93	6404	6768	7132	7496	7860	8224	8588	8952	9316	9680
94	077 0043	0407	0771	1134	1498	1862	2225	2589	2952	3316
95	3679	4042	4406	4769	5133	5496	5859	6222	6585	6949
96	7312	7675̄	8038	8401	8764	9127	9490	9853	0̄216	0̄579
97	078 0942	1304	1667	2030	2393	2755	3118	3480	3843	4206
98	4568	4931	5293	5656	6018	6380	6743	7105	7467	7830
99	8192	8554	8916	9278	9640	0̄003	0̄365̄	0̄727	1̄089	1̄451
1200	079 1812	2174	2536	2898	3260	3622	3983	4345	4707	5068
N.	0	1	2	3	4	5	6	7	8	9

P. P.

	378	377	376
1	37.8	37.7	37.6
2	75.6	75.4	75.2
3	113.4	113.1	112.8
4	151.2	150.8	150.4
5	189.0	188.5	188.0
6	226.8	226.2	225.6
7	264.6	263.9	263.2
8	302.4	301.6	300.8
9	340.2	339.3	338.4

	375	374	373
1	37.5	37.4	37.3
2	75.0	74.8	74.6
3	112.5	112.2	111.9
4	150.0	149.6	149.2
5	187.5	187.0	186.5
6	225.0	224.4	223.8
7	262.5	261.8	261.1
8	300.0	299.2	298.4
9	337.5	336.6	335.7

	372	371	370
1	37.2	37.1	37.0
2	74.4	74.2	74.0
3	111.6	111.3	111.0
4	148.8	148.4	148.0
5	186.0	185.5	185.0
6	223.2	222.6	222.0
7	260.4	259.7	259.0
8	297.6	296.8	296.0
9	334.8	333.9	333.0

	369	368	367
1	36.9	36.8	36.7
2	73.8	73.6	73.4
3	110.7	110.4	110.1
4	147.6	147.2	146.8
5	184.5	184.0	183.5
6	221.4	220.8	220.2
7	258.3	257.6	256.9
8	295.2	294.4	293.6
9	332.1	331.2	330.3

	366	365	364
1	36.6	36.5	36.4
2	73.2	73.0	72.8
3	109.8	109.5	109.2
4	146.4	146.0	145.6
5	183.0	182.5	182.0
6	219.6	219.0	218.4
7	256.2	255.5	254.8
8	292.8	292.0	291.2
9	329.4	328.5	327.6

	363	362	361
1	36.3	36.2	36.1
2	72.6	72.4	72.2
3	108.9	108.6	108.3
4	145.2	144.8	144.4
5	181.5	181.0	180.5
6	217.8	217.2	216.6
7	254.1	253.4	252.7
8	290.4	289.6	288.8
9	326.7	325.8	324.9

P. P.

N.	0	1	2	3	4	5	6	7	8	9
1200	079 1812	2174	2536	2898	3260	3622	3983	4345	4707	5068
01	5430	5792	6153	6515̄	6876	7238	7599	7961	8322	8683
02	9045̄	9406	9767	0̄128	0̄490	0̄851	1̄212	1̄573	1̄934	2̄295
03	080 2656	3017	3378	3739	4100	4461	4822	5183	5543	5904
04	6265̄	6626	6986	7347	7707	8068	8429	8789	9150	9510
05	9870	0̄231	0̄591	0̄952	1̄312	1̄672	2̄032	2̄393	2̄753	3̄113
06	081 3473	3833	4193	4553	4913	5273	5633	5993	6353	6713
07	7073	7432	7792	8152	8512	8871	9231	9591	9950	0̄310
08	082 0669	1029	1388	1748	2107	2467	2826	3185	3545̄	3904
09	4263	4622	4981	5341	5700	6059	6418	6777	7136	7495̄
1210	7854	8213	8571	8930	9289	9648	0̄007	0̄365	0̄724	1̄083
11	083 1441	1800	2159	2517	2876	3234	3593	3951	4309	4668
12	5026	5385̄	5743	6101	6459	6817	7176	7534	7892	8250
13	8608	8966	9324	9682	0̄040	0̄398	0̄756	1̄114	1̄471	1̄829
14	084 2187	2545̄	2902	3260	3618	3975	4333	4690	5048	5405
15	5763	6120	6478	6835̄	7192	7550	7907	8264	8621	8979
16	9336	9693	0̄050	0̄407	0̄764	1̄121	1̄478	1̄835	2̄192	2̄549
17	085 2906	3263	3619	3976	4333	4690	5046	5403	5760	6116
18	6473	6829	7186	7542	7899	8255	8612	8968	9324	9681
19	086 0037	0393	0750	1106	1462	1818	2174	2530	2886	3242
1220	3598	3954	4310	4666	5022	5378	5734	6089	6445	6801
21	7157	7512	7868	8224	8579	8935̄	9290	9646	0̄001	0̄357
22	087 0712	1067	1423	1778	2133	2489	2844	3199	3554	3909
23	4265̄	4620	4975̄	5330	5685̄	6040	6395̄	6750	7104	7459
24	7814	8169	8524	8878	9233	9588	9943	0̄297	0̄652	1̄006
25	088 1361	1715	2070	2424	2779	3133	3488	3842	4196	4550
26	4905̄	5259	5613	5967	6321	6676	7030	7384	7738	8092
27	8446	8800	9153	9507	9861	0̄215	0̄569	0̄923	1̄276	1̄630
28	089 1984	2337	2691	3045̄	3398	3752	4105	4459	4812	5165
29	5519	5872	6226	6579	6932	7285	7639	7992	8345̄	8698
1230	9051	9404	9757	0̄110	0̄463	0̄816	1̄169	1̄522	1̄875̄	2̄228
31	090 2581	2933	3286	3639	3991	4344	4697	5049	5402	5755̄
32	6107	6460	6812	7164	7517	7869	8222	8574	8926	9279
33	9631	9983	0̄335	0̄687	1̄039	1̄392	1̄744	2̄096	2̄448	2̄800
34	091 3152	3504	3855	4207	4559	4911	5263	5614	5966	6318
35	6670	7021	7373	7724	8076	8427	8779	9130	9482	9833
36	092 0185̄	0536	0887	1239	1590	1941	2292	2644	2995̄	3346
37	3697	4048	4399	4750	5101	5452	5803	6154	6505̄	6856
38	7206	7557	7908	8259	8609	8960	9311	9661	0̄012	0̄363
39	093 0713	1064	1414	1764	2115̄	2465	2816	3166	3516	3867
1240	4217	4567	4917	5267	5618	5968	6318	6668	7018	7368
41	7718	8068	8418	8768	9117	9467	9817	0̄167	0̄517	0̄866
42	094 1216	1566	1915	2265̄	2614	2964	3313	3663	4012	4362
43	4711	5061	5410	5759	6109	6458	6807	7156	7506	7855̄
44	8204	8553	8902	9251	9600	9949	0̄298	0̄647	0̄996	1̄345̄
45	095 1694	2042	2391	2740	3089	3437	3786	4135̄	4483	4832
46	5180	5529	5877	6226	6574	6923	7271	7620	7968	8316
47	8665̄	9013	9361	9709	0̄057	0̄406	0̄754	1̄102	1̄450	1̄798
48	096 2146	2494	2842	3190	3538	3885	4233	4581	4929	5277
49	5624	5972	6320	6667	7015	7363	7710	8058	8405	8753
1250	9100	9448	9795̄	0̄142	0̄490	0̄837	1̄184	1̄531	1̄879	2̄226
N.	0	1	2	3	4	5	6	7	8	9

P. P.

	362	361	360
1	36.2	36.1	36.0
2	72.4	72.2	72.0
3	108.6	108.3	108.0
4	144.8	144.4	144.0
5	181.0	180.5	180.0
6	217.2	216.6	216.0
7	253.4	252.7	252.0
8	289.6	288.8	288.0
9	325.8	324.9	324.0

	359	358	357
1	35.9	35.8	35.7
2	71.8	71.6	71.4
3	107.7	107.4	107.1
4	143.6	143.2	142.8
5	179.5	179.0	178.5
6	215.4	214.8	214.2
7	251.3	250.6	249.9
8	287.2	286.4	285.6
9	323.1	322.2	321.3

	356	355	354
1	35.6	35.5	35.4
2	71.2	71.0	70.8
3	106.8	106.5	106.2
4	142.4	142.0	141.6
5	178.0	177.5	177.0
6	213.6	213.0	212.4
7	249.2	248.5	247.8
8	284.8	284.0	283.2
9	320.4	319.5	318.6

	353	352	351
1	35.3	35.2	35.1
2	70.6	70.4	70.2
3	105.9	105.6	105.3
4	141.2	140.8	140.4
5	176.5	176.0	175.5
6	211.8	211.2	210.6
7	247.1	246.4	245.7
8	282.4	281.6	280.8
9	317.7	316.8	315.9

	350	349	348
1	35.0	34.9	34.8
2	70.0	69.8	69.6
3	105.0	104.7	104.4
4	140.0	139.6	139.2
5	175.0	174.5	174.0
6	210.0	209.4	208.8
7	245.0	244.3	243.6
8	280.0	279.2	278.4
9	315.0	314.1	313.2

	347
1	34.7
2	69.4
3	104.1
4	138.8
5	173.5
6	208.2
7	242.9
8	277.6
9	312.3

P. P.

N.	0	1	2	3	4	5	6	7	8	9
1250	096 9100	9448	9795̄	0̄142	0̄490	0̄837	1̄184	1̄531	1̄879	2̄226
51	097 2573	2920	3267	3614	3962	4309	4656	5003	5349	5696
52	6043	6390	6737	7084	7431	7777	8124	8471	8817	9164
53	9511	9857	0̄204	0̄550	0̄897	1̄243	1̄590	1̄936	2̄283	2̄629
54	098 2975	3322	3668	4014	4360	4707	5053	5399	5745	6091
55	6437	6783	7129	7475	7821	8167	8513	8859	9205̄	9551
56	9896	0̄242	0̄588	0̄934	1̄279	1̄625̄	1̄971	2̄316	2̄662	3̄007
57	099 3353	3698	4044	4389	4735̄	5080	5425	5771	6116	6461
58	6806	7152	7497	7842	8187	8532	8877	9222	9567	9912
59	100 0257	0602	0947	1292	1637	1982	2327	2671	3016	3361
1260	3705	4050	4395̄	4739	5084	5429	5773	6118	6462	6806
61	7151	7495	7840	8184	8528	8873	9217	9561	9905	0̄249
62	101 0594	0938	1282	1626	1970	2314	2658	3002	3346	3690
63	4034	4377	4721	5065̄	5409	5752	6096	6440	6784	7127
64	7471	7814	8158	8501	8845̄	9188	9532	9875	0̄219	0̄562
65	102 0905	1249	1592	1935	2278	2621	2965̄	3308	3651	3994
66	4337	4680	5023	5366	5709	6052	6395̄	6738	7081	7423
67	7766	8109	8452	8794	9137	9480	9822	0̄165̄	0̄507	0̄850
68	103 1193	1535	1877	2220	2562	2905̄	3247	3589	3932	4274
69	4616	4958	5301	5643	5985̄	6327	6669	7011	7353	7695
1270	8037	8379	8721	9063	9405̄	9747	0̄089	0̄430	0̄772	1̄114
71	104 1456	1797	2139	2480	2822	3164	3505	3847	4188	4530
72	4871	5213	5554	5895	6237	6578	6919	7260	7602	7943
73	8284	8625	8966	9307	9648	9989	0̄331	0̄671	1̄012	1̄353
74	105 1694	2035	2376	2717	3058	3398	3739	4080	4421	4761
75	5102	5442	5783	6124	6464	6805̄	7145	7486	7826	8166
76	8507	8847	9187	9528	9868	0̄208	0̄548	0̄889	1̄229	1̄569
77	106 1909	2249	2589	2929	3269	3609	3949	4289	4629	4969
78	5309	5648	5988	6328	6668	7007	7347	7687	8026	8366
79	8705	9045̄	9385̄	9724	0̄063	0̄403	0̄742	1̄082	1̄421	1̄760
1280	107 2100	2439	2778	3117	3457	3796	4135̄	4474	4813	5152
81	5491	5830	6169	6508	6847	7186	7525̄	7864	8203	8541
82	8880	9219	9558	9896	0̄235	0̄574	0̄912	1̄251	1̄590	1̄928
83	108 2267	2605	2944	3282	3620	3959	4297	4635	4974	5312
84	5650	5988	6327	6665̄	7003	7341	7679	8017	8355	8693
85	9031	9369	9707	0̄045	0̄383	0̄721	1̄059	1̄396	1̄734	2̄072
86	109 2410	2747	3085	3423	3760	4098	4435	4773	5111	5448
87	5785	6123	6460	6798	7135	7472	7810	8147	8484	8821
88	9159	9496	9833	0̄170	0̄507	0̄844	1̄181	1̄518	1̄855	2̄192
89	110 2529	2866	3203	3540	3877	4213	4550	4887	5224	5560
1290	5897	6234	6570	6907	7244	7580	7917	8253	8590	8926
91	9262	9599	9935	0̄272	0̄608	0̄944	1̄280	1̄617	1̄953	2̄289
92	111 2625	2961	3297	3633	3969	4306	4642	4977	5313	5649
93	5985	6321	6657	6993	7329	7664	8000	8336	8671	9007
94	9343	9678	0̄014	0̄350	0̄685	1̄021	1̄356	1̄691	2̄027	2̄362
95	112 2698	3033	3368	3704	4039	4374	4709	5045̄	5380	5715̄
96	6050	6385	6720	7055	7390	7725	8060	8395	8730	9065̄
97	9400	9735̄	0̄069	0̄404	0̄739	1̄074	1̄408	1̄743	2̄078	2̄412
98	113 2747	3081	3416	3751	4085	4420	4754	5088	5423	5757
99	6092	6426	6760	7094	7429	7763	8097	8431	8765	9099
1300	9434	9768	0̄102	0̄436	0̄770	1̄104	1̄437	1̄771	2̄105	2̄439
N.	0	1	2	3	4	5	6	7	8	9

P. P.

	348	347	346
1	34.8	34.7	34.6
2	69.6	69.4	69.2
3	104.4	104.1	103.8
4	139.2	138.8	138.4
5	174.0	173.5	173.0
6	208.8	208.2	207.6
7	243.6	242.9	242.2
8	278.4	277.6	276.8
9	313.2	312.3	311.4

	345	344	343
1	34.5	34.4	34.3
2	69.0	68.8	68.6
3	103.5	103.2	102.9
4	138.0	137.6	137.2
5	172.5	172.0	171.5
6	207.0	206.4	205.8
7	241.5	240.8	240.1
8	276.0	275.2	274.4
9	310.5	309.6	308.7

	342	341	340
1	34.2	34.1	34.0
2	68.4	68.2	68.0
3	102.6	102.3	102.0
4	136.8	136.4	136.0
5	171.0	170.5	170.0
6	205.2	204.6	204.0
7	239.4	238.7	238.0
8	273.6	272.8	272.0
9	307.8	306.9	306.0

	339	338	337
1	33.9	33.8	33.7
2	67.8	67.6	67.4
3	101.7	101.4	101.1
4	135.6	135.2	134.8
5	169.5	169.0	168.5
6	203.4	202.8	202.2
7	237.3	236.6	235.9
8	271.2	270.4	269.6
9	305.1	304.2	303.3

	336	335	334
1	33.6	33.5	33.4
2	67.2	67.0	66.8
3	100.8	100.5	100.2
4	134.4	134.0	133.6
5	168.0	167.5	167.0
6	201.6	201.0	200.4
7	235.2	234.5	233.8
8	268.8	268.0	267.2
9	302.4	301.5	300.6

	333
1	33.3
2	66.6
3	99.9
4	133.2
5	166.5
6	199.8
7	233.1
8	266.4
9	299.7

P. P.

N.	0	1	2	3	4	5	6	7	8	9
1300	113 9434	9768	0̄102	0̄436	0̄770	1̄104	1̄437	1̄771	2̄105	2̄439
01	114 2773	3107	3441	3774	4108	4442	4775	5109	5443	5776
02	6110	6443	6777	7110	7444	7777	8111	8444	8777	9111
03	9444	9777	0̄111	0̄444	0̄777	1̄110	1̄444	1̄777	2̄110	2̄443
04	115 2776	3109	3442	3775̄	4108	4441	4774	5107	5439	5772
05	6105	6438	6771	7103	7436	7769	8101	8434	8767	9099
06	9432	9764	0̄097	0̄429	0̄762	1̄094	1̄427	1̄759	2̄091	2̄424
07	116 2756	3088	3420	3753	4085̄	4417	4749	5081	5413	5745
08	6077	6409	6741	7073	7405	7737	8069	8401	8733	9065̄
09	9396	9728	0̄060	0̄392	0̄723	1̄055	1̄387	1̄718	2̄050	2̄381
1310	117 2713	3044	3376	3707	4039	4370	4702	5033	5364	5696
11	6027	6358	6689	7021	7352	7683	8014	8345	8676	9007
12	9338	9669	0̄000	0̄331	0̄662	0̄993	1̄324	1̄655̄	1̄986	2̄316
13	118 2647	2978	3309	3639	3970	4301	4631	4962	5293	5623
14	5954	6284	6615̄	6945	7276	7606	7936	8267	8597	8927
15	9258	9588	9918	0̄248	0̄578	0̄909	1̄239	1̄569	1̄899	2̄229
16	119 2559	2889	3219	3549	3879	4209	4539	4868	5198	5528
17	5858	6187	6517	6847	7177	7506	7836	8165	8495	8825̄
18	9154	9484	9813	0̄143	0̄472	0̄801	1̄131	1̄460	1̄789	2̄119
19	120 2448	2777	3106	3436	3765̄	4094	4423	4752	5081	5410
1320	5739	6068	6397	6726	7055	7384	7713	8042	8371	8699
21	9028	9357	9686	0̄014	0̄343	0̄672	1̄000	1̄329	1̄657	1̄986
22	121 2315̄	2643	2972	3300	3628	3957	4285	4614	4942	5270
23	5598	5927	6255̄	6583	6911	7239	7568	7896	8224	8552
24	8880	9208	9536	9864	0̄192	0̄520	0̄848	1̄175	1̄503	1̄831
25	122 2159	2487	2814	3142	3470	3797	4125̄	4453	4780	5108
26	5435	5763	6090	6418	6745	7073	7400	7727	8055̄	8382
27	8709	9036	9364	9691	0̄018	0̄345	0̄672	1̄000	1̄327	1̄654
28	123 1981	2308	2635̄	2962	3289	3616	3942	4269	4596	4923
29	5250	5577	5903	6230	6557	6883	7210	7537	7863	8190
1330	8516	8843	9169	9496	9822	0̄149	0̄475	0̄802	1̄128	1̄454
31	124 1781	2107	2433	2759	3086	3412	3738	4064	4390	4716
32	5042	5368	5694	6020	6346	6672	6998	7324	7650	7976
33	8301	8627	8953	9279	9605̄	9930	0̄256	0̄582	0̄907	1̄233
34	125 1558	1884	2209	2535̄	2860	3186	3511	3837	4162	4487
35	4813	5138	5463	5788	6114	6439	6764	7089	7414	7739
36	8065̄	8390	8715̄	9040	9365̄	9690	0̄015̄	0̄339	0̄664	0̄989
37	126 1314	1639	1964	2288	2613	2938	3263	3587	3912	4237
38	4561	4886	5210	5535̄	5859	6184	6508	6833	7157	7481
39	7806	8130	8454	8779	9103	9427	9751	0̄076	0̄400	0̄724
1340	127 1048	1372	1696	2020	2344	2668	2992	3316	3640	3964
41	4288	4612	4935	5259	5583	5907	6230	6554	6878	7202
42	7525	7849	8172	8496	8819	9143	9466	9790	0̄113	0̄437
43	128 0760	1083	1407	1730	2053	2377	2700	3023	3346	3670
44	3993	4316	4639	4962	5285	5608	5931	6254	6577	6900
45	7223	7546	7869	8191	8514	8837	9160	9483	9805	0̄128
46	129 0451	0773	1096	1418	1741	2064	2386	2709	3031	3354
47	3676	3998	4321	4643	4965	5288	5610	5932	6255̄	6577
48	6899	7221	7543	7865	8187	8510	8832	9154	9476	9798
49	130 0119	0441	0763	1085	1407	1729	2051	2372	2694	3016
1350	3338	3659	3981	4303	4624	4946	5267	5589	5911	6232
N.	0	1	2	3	4	5	6	7	8	9

P. P.

	334	333
1	33.4	33.3
2	66.8	66.6
3	100.2	99.9
4	133.6	133.2
5	167.0	166.5
6	200.4	199.8
7	233.8	233.1
8	267.2	266.4
9	300.6	299.7

	332	331
1	33.2	33.1
2	66.4	66.2
3	99.6	99.3
4	132.8	132.4
5	166.0	165.5
6	199.2	198.6
7	232.4	231.7
8	265.6	264.8
9	298.8	297.9

	330	329
1	33.0	32.9
2	66.0	65.8
3	99.0	98.7
4	132.0	131.6
5	165.0	164.5
6	198.0	197.4
7	231.0	230.3
8	264.0	263 2
9	297.0	296.1

	328	327
1	32.8	32 7
2	65.6	65.4
3	98.4	98.1
4	131 2	130.8
5	164.0	163.5
6	196.8	196.2
7	229.6	228.9
8	262.4	261.6
9	295.2	294.3

	326	325
1	32.6	32.5
2	65 2	65.0
3	97.8	97.5
4	130.4	130.0
5	163.0	162.5
6	195.6	195.0
7	228.2	227.5
8	260 8	260.0
9	293 4	292 5

	324	323
1	32.4	32.3
2	64.8	64.6
3	97.2	96.9
4	129.6	129.2
5	162.0	161.5
6	194.4	193.8
7	226.8	226.1
8	259.2	258.4
9	291.6	290.7

	322	321
1	32.2	32.1
2	64.4	64.2
3	96.6	96.3
4	128 8	128.4
5	161.0	160.5
6	193.2	192.6
7	225.4	224.7
8	257.6	256.8
9	289.8	288.9

P. P.

N.	0	1	2	3	4	5	6	7	8	9
1350	130 3338	3659	3981	4303	4624	4946	5267	5589	5911	6232
51	6553	6875̄	7196	7518	7839	8161	8482	8803	9124	9446
52	9767	0̄088	0̄409	0̄730	1̄052	1̄373	1̄694	2̄015̄	2̄336	2̄657
53	131 2978	3299	3620	3941	4262	4583	4903	5224	5545	5866
54	6187	6507	6828	7149	7469	7790	8111	8431	8752	9072
55	9393	9713	0̄034	0̄354	0̄675̄	0̄995	1̄316	1̄636	1̄956	2̄277
56	132 2597	2917	3237	3558	3878	4198	4518	4838	5158	5478
57	5798	6119	6439	6758	7078	7398	7718	8038	8358	8678
58	8998	9317	9637	9957	0̄277	0̄596	0̄916	1̄236	1̄555	1̄875̄
59	133 2195̄	2514	2834	3153	3473	3792	4112	4431	4750	5070
1360	5389	5708	6028	6347	6666	6985	7305̄	7624	7943	8262
61	8581	8900	9219	9538	9857	0̄176	0̄495	0̄814	1̄133	1̄452
62	134 1771	2090	2409	2728	3046	3365	3684	4003	4321	4640
63	4959	5277	5596	5914	6233	6551	6870	7188	7507	7825
64	8144	8462	8780	9099	9417	9735	0̄054	0̄372	0̄690	1̄008
65	135 1327	1645̄	1963	2281	2599	2917	3235	3553	3871	4189
66	4507	4825̄	5143	5461	5779	6096	6414	6732	7050	7367
67	7685	8003	8320	8638	8956	9273	9591	9908	0̄226	0̄543
68	136 0861	1178	1496	1813	2131	2448	2765	3083	3400	3717
69	4034	4352	4669	4986	5303	5620	5937	6255̄	6572	6889
1370	7206	7523	7840	8157	8473	8790	9107	9424	9741	0̄058
71	137 0375̄	0691	1008	1325̄	1641	1958	2275̄	2591	2908	3225̄
72	3541	3858	4174	4491	4807	5124	5440	5756	6073	6389
73	6705	7022	7338	7654	7970	8287	8603	8919	9235	9551
74	9867	0̄183	0̄499	0̄815	1̄131	1̄447	1̄763	2̄079	2̄395	2̄711
75	138 3027	3343	3659	3974	4290	4606	4922	5237	5553	5869
76	6184	6500	6816	7131	7447	7762	8078	8393	8709	9024
77	9339	9655̄	9970	0̄285	0̄601	0̄916	1̄231	1̄547	1̄862	2̄177
78	139 2492	2807	3122	3438	3753	4068	4383	4698	5013	5328
79	5643	5958	6272	6587	6902	7217	7532	7847	8161	8476
1380	8791	9106	9420	9735̄	0̄050	0̄364	0̄679	0̄993	1̄308	1̄622
81	140 1937	2251	2566	2880	3195̄	3509	3823	4138	4452	4766
82	5080	5395̄	5709	6023	6337	6651	6966	7280	7594	7908
83	8222	8536	8850	9164	9478	9792	0̄106	0̄419	0̄733	1̄047
84	141 1361	1675̄	1988	2302	2616	2930	3243	3557	3871	4184
85	4498	4811	5125̄	5438	5752	6065	6379	6692	7006	7319
86	7632	7946	8259	8572	8885	9199	9512	9825	0̄138	0̄451
87	142 0765̄	1078	1391	1704	2017	2330	2643	2956	3269	3582
88	3895̄	4208	4520	4833	5146	5459	5772	6084	6397	6710
89	7022	7335	7648	7960	8273	8586	8898	9211	9523	9836
1390	143 0148	0460	0773	1085	1398	1710	2022	2335̄	2647	2959
91	3271	3584	3896	4208	4520	4832	5144	5456	5768	6080
92	6392	6704	7016	7328	7640	7952	8264	8576	8888	9199
93	9511	9823	0̄135̄	0̄446	0̄758	1̄070	1̄381	1̄693	2̄005̄	2̄316
94	144 2628	2939	3251	3562	3874	4185	4497	4808	5119	5431
95	5742	6053	6365̄	6676	6987	7298	7610	7921	8232	8543
96	8854	9165	9476	9787	0̄098	0̄409	0̄720	1̄031	1̄342	1̄653
97	145 1964	2275̄	2586	2897	3207	3518	3829	4140	4450	4761
98	5072	5382	5693	6004	6314	6625̄	6935	7246	7556	7867
99	8177	8488	8798	9108	9419	9729	0̄039	0̄350	0̄660	0̄970
1400	146 1280	1591	1901	2211	2521	2831	3141	3451	3761	4071
N.	0	1	2	3	4	5	6	7	8	9

P. P.

	322	321
1	32.2	32.1
2	64.4	64.2
3	96.6	96.3
4	128.8	128.4
5	161.0	160.5
6	193.2	192.6
7	225.4	224.7
8	257.6	256.8
9	289.8	288.9

	320	319
1	32.0	31.9
2	64.0	63.8
3	96.0	95.7
4	128.0	127.6
5	160.0	159.5
6	192.0	191.4
7	224.0	223.3
8	256.0	255.2
9	288.0	287.1

	318	317
1	31.8	31.7
2	63.6	63.4
3	95.4	95.1
4	127.2	126.8
5	159.0	158.5
6	190.8	190.2
7	222.6	221.9
8	254.4	253.6
9	286.2	285.3

	316	315
1	31.6	31.5
2	63.2	63.0
3	94.8	94.5
4	126.4	126.0
5	158.0	157.5
6	189.6	189.0
7	221.2	220.5
8	252.8	252.0
9	284.4	283.5

	314	313
1	31.4	31.3
2	62.8	62.6
3	94.2	93.9
4	125.6	125.2
5	157.0	156.5
6	188.4	187.8
7	219.8	219.1
8	251.2	250.4
9	282.6	281.7

	312	311
1	31.2	31.1
2	62.4	62.2
3	93.6	93.3
4	124.8	124.4
5	156.0	155.5
6	187.2	186.6
7	218.4	217.7
8	249.6	248.8
9	280.8	279.9

	310
1	31.0
2	62.0
3	93.0
4	124.0
5	155.0
6	186.0
7	217.0
8	248.0
9	279.0

P. P.

N.	0	1	2	3	4	5	6	7	8	9
1400	146 1280	1591	1901	2211	2521	2831	3141	3451	3761	4071
01	4381	4691	5001	5311	5621	5931	6241	6551	6861	7170
02	7480	7790	8100	8409	8719	9029	9338	9648	9958	0̄267
03	147 0577	0886	1196	1505	1815̄	2124	2434	2743	3052	3362
04	3671	3980	4290	4599	4908	5217	5527	5836	6145̄	6454
05	6763	7072	7381	7690	7999	8308	8617	8926	9235	9544
06	9853	0̄162	0̄471	0̄780	1̄089	1̄397	1̄706	2̄015̄	2̄324	2̄632
07	148 2941	3250	3558	3867	4175	4484	4793	5101	5410	5718
08	6027	6335̄	6643	6952	7260	7569	7877	8185	8493	8802
09	9110	9418	9726	0̄035̄	0̄343	0̄651	0̄959	1̄267	1̄575	1̄883
1410	149 2191	2499	2807	3115	3423	3731	4039	4347	4655̄	4962
11	5270	5578	5886	6193	6501	6809	7116	7424	7732	8039
12	8347	8655̄	8962	9270	9577	9885̄	0̄192	0̄499	0̄807	1̄114
13	150 1422	1729	2036	2344	2651	2958	3265	3573	3880	4187
14	4494	4801	5108	5415	5722	6030	6337	6644	6951	7257
15	7564	7871	8178	8485	8792	9099	9406	9712	0̄019	0̄326
16	151 0633	0939	1246	1553	1859	2166	2472	2779	3085	3392
17	3699	4005̄	4311	4618	4924	5231	5537	5843	6150	6456
18	6762	7069	7375̄	7681	7987	8293	8600	8906	9212	9518
19	9824	0̄130	0̄436	0̄742	1̄048	1̄354	1̄660	1̄966	2̄272	2̄578
1420	152 2883	3189	3495	3801	4107	4412	4718	5024	5329	5635
21	5941	6246	6552	6858	7163	7469	7774	8080	8385	8691
22	8996	9301	9607	9912	0̄217	0̄523	0̄828	1̄133	1̄439	1̄744
23	153 2049	2354	2659	2964	3270	3575̄	3880	4185̄	4490	4795̄
24	5100	5405̄	5710	6015̄	6320	6625̄	6929	7234	7539	7844
25	8149	8453	8758	9063	9368	9672	9977	0̄281	0̄586	0̄891
26	154 1195	1500	1804	2109	2413	2718	3022	3327	3631	3935
27	4240	4544	4848	5153	5457	5761	6065	6370	6674	6978
28	7282	7586	7890	8194	8498	8802	9106	9410	9714	0̄018
29	155 0322	0626	0930	1234	1538	1842	2145	2449	2753	3057
1430	3360	3664	3968	4271	4575	4879	5182	5486	5789	6093
31	6396	6700	7003	7307	7610	7914	8217	8520	8824	9127
32	9430	9733	0̄037	0̄340	0̄643	0̄946	1̄249	1̄553	1̄856	2̄159
33	156 2462	2765̄	3068	3371	3674	3977	4280	4583	4886	5189
34	5492	5794	6097	6400	6703	7006	7308	7611	7914	8216
35	8519	8822	9124	9427	9729	0̄032	0̄334	0̄637	0̄939	1̄242
36	157 1544	1847	2149	2452	2754	3056	3359	3661	3963	4265
37	4568	4870	5172	5474	5776	6079	6381	6683	6985̄	7287
38	7589	7891	8193	8495̄	8797	9099	9401	9702	0̄004	0̄306
39	158 0608	0910	1212	1513	1815̄	2117	2418	2720	3022	3323
1440	3625̄	3927	4228	4530	4831	5133	5434	5736	6037	6338
41	6640	6941	7243	7544	7845	8146	8448	8749	9050	9351
42	9653	9954	0̄255̄	0̄556	0̄857	1̄158	1̄459	1̄760	2̄061	2̄362
43	159 2663	2964	3265	3566	3867	4168	4469	4770	5070	5371
44	5672	5973	6273	6574	6875̄	7175	7476	7777	8077	8378
45	8678	8979	9280	9580	9881	0̄181	0̄481	0̄782	1̄082	1̄383
46	160 1683	1983	2284	2584	2884	3184	3485̄	3785̄	4085	4385
47	4685	4985	5286	5586	5886	6186	6486	6786	7086	7386
48	7686	7986	8285	8585	8885	9185̄	9485̄	9785̄	0̄084	0̄384
49	161 0684	0984	1283	1583	1883	2182	2482	2781	3081	3380
1450	3680	3980	4279	4578	4878	5177	5477	5776	6075	6375̄
N.	0	1	2	3	4	5	6	7	8	9

P. P.

	311	310
1	31.1	31.0
2	62.2	62.0
3	93.3	93.0
4	124.4	124.0
5	155.5	155.0
6	186.6	186.0
7	217.7	217.0
8	248.8	248.0
9	279.9	279.0

	309	308
1	30.9	30.8
2	61.8	61.6
3	92.7	92.4
4	123.6	123.2
5	154.5	154.0
6	185.4	184.8
7	216.3	215.6
8	247.2	246.4
9	278.1	277.2

	307	306
1	30.7	30.6
2	61.4	61.2
3	92.1	91.8
4	122.8	122.4
5	153.5	153.0
6	184.2	183.6
7	214.9	214.2
8	245.6	244.8
9	276.3	275.4

	305	304
1	30.5	30.4
2	61.0	60.8
3	91.5	91.2
4	122.0	121.6
5	152.5	152.0
6	183.0	182.4
7	213.5	212.8
8	244.0	243.2
9	274.5	273.6

	303	302
1	30.3	30.2
2	60.6	60.4
3	90.9	90.6
4	121.2	120.8
5	151.5	151.0
6	181.8	181.2
7	212.1	211.4
8	242.4	241.6
9	272.7	271.8

	301	300
1	30.1	30.0
2	60.2	60.0
3	90.3	90.0
4	120.4	120.0
5	150.5	150.0
6	180.6	180.0
7	210.7	210.0
8	240.8	240.0
9	270.9	270.0

	299
1	29.9
2	59.8
3	89.7
4	119.6
5	149.5
6	179.4
7	209.3
8	239.2
9	269.1

P. P.

N.	0	1	2	3	4	5	6	7	8	9
1450	161 3680	3980	4279	4578	4878	5177	5477	5776	6075	6375̅
51	6674	6973	7273	7572	7871	8170	8470	8769	9068	9367
52	9666	9965	0̅264	0̅563	0̅862	1̅161	1̅460	1̅759	2̅058	2̅357
53	162 2656	2955	3254	3553	3852	4150	4449	4748	5047	5345
54	5644	5943	6241	6540	6839	7137	7436	7734	8033	8331
55	8630	8928	9227	9525	9824	0̅122	0̅420	0̅719	1̅017	1̅315
56	163 1614	1912	2210	2508	2807	3105̅	3403	3701	3999	4297
57	4596	4894	5192	5490	5788	6086	6384	6682	6979	7277
58	7575	7873	8171	8469	8767	9064	9362	9660	9958	0̅255
59	164 0553	0851	1148	1446	1743	2041	2339	2636	2934	3231
1460	3529	3826	4123	4421	4718	5016	5313	5610	5908	6205̅
61	6502	6799	7097	7394	7691	7988	8285	8582	8880	9177
62	9474	9771	0̅068	0̅365̅	0̅662	0̅959	1̅256	1̅553	1̅850	2̅146
63	165 2443	2740	3037	3334	3631	3927	4224	4521	4817	5114
64	5411	5707	6004	6301	6597	6894	7190	7487	7783	8080
65	8376	8673	8969	9265	9562	9858	0̅155̅	0̅451	0̅747	1̅043
66	166 1340	1636	1932	2228	2525̅	2821	3117	3413	3709	4005
67	4301	4597	4893	5189	5485	5781	6077	6373	6669	6965̅
68	7261	7556	7852	8148	8444	8740	9035	9331	9627	9922
69	167 0218	0514	0809	1105̅	1400	1696	1991	2287	2582	2878
1470	3173	3469	3764	4060	4355̅	4650	4946	5241	5536	5831
71	6127	6422	6717	7012	7308	7603	7898	8193	8488	8783
72	9078	9373	9668	9963	0̅258	0̅553	0̅848	1̅143	1̅438	1̅733
73	168 2027	2322	2617	2912	3207	3501	3796	4091	4386	4680
74	4975̅	5269	5564	5859	6153	6448	6742	7037	7331	7626
75	7920	8215̅	8509	8803	9098	9392	9686	9981	0̅275	0̅569
76	169 0864	1158	1452	1746	2040	2335̅	2629	2923	3217	3511
77	3805̅	4099	4393	4687	4981	5275̅	5569	5863	6157	6450
78	6744	7038	7332	7626	7920	8213	8507	8801	9094	9388
79	9682	9975	0̅269	0̅563	0̅856	1̅150	1̅443	1̅737	2̅030	2̅324
1480	170 2617	2911	3204	3497	3791	4084	4377	4671	4964	5257
81	5551	5844	6137	6430	6723	7017	7310	7603	7896	8189
82	8482	8775	9068	9361	9654	9947	0̅240	0̅533	0̅826	1̅119
83	171 1412	1704	1997	2290	2583	2876	3168	3461	3754	4046
84	4339	4632	4924	5217	5509	5802	6095̅	6387	6680	6972
85	7265̅	7557	7849	8142	8434	8727	9019	9311	9604	9896
86	172 0188	0480	0773	1065̅	1357	1649	1941	2233	2526	2818
87	3110	3402	3694	3986	4278	4570	4862	5154	5446	5737
88	6029	6321	6613	6905̅	7197	7488	7780	8072	8364	8655
89	8947	9239	9530	9822	0̅113	0̅405	0̅697	0̅988	1̅280	1̅571
1490	173 1863	2154	2446	2737	3028	3320	3611	3903	4194	4485
91	4776	5068	5359	5650	5941	6233	6524	6815̅	7106	7397
92	7688	7979	8270	8561	8852	9143	9434	9725	0̅016	0̅307
93	174 0598	0889	1180	1471	1761	2052	2343	2634	2925̅	3215
94	3506	3797	4087	4378	4669	4959	5250	5540	5831	6121
95	6412	6702	6993	7283	7574	7864	8155̅	8445̅	8735	9026
96	9316	9606	9897	0̅187	0̅477	0̅767	1̅057	1̅348	1̅638	1̅928
97	175 2218	2508	2798	3088	3378	3668	3958	4248	4538	4828
98	5118	5408	5698	5988	6278	6567	6857	7147	7437	7727
99	8016	8306	8596	8885	9175	9465̅	9754	0̅044	0̅333	0̅623
1500	176 0913	1202	1492	1781	2071	2360	2649	2939	3228	3518
N.	0	1	2	3	4	5	6	7	8	9

P. P.

	300	299
1	30.0	29.9
2	60.0	59.8
3	90.0	89.7
4	120.0	119.6
5	150.0	149.5
6	180.0	179.4
7	210.0	209.3
8	240.0	239.2
9	270.0	269.1

	298	297
1	29.8	29.7
2	59.6	59.4
3	89.4	89.1
4	119.2	118.8
5	149.0	148.5
6	178.8	178.2
7	208.6	207.9
8	238.4	237.6
9	268.2	267.3

	296	295
1	29.6	29.5
2	59.2	59.0
3	88.8	88.5
4	118.4	118.0
5	148.0	147.5
6	177.6	177.0
7	207.2	206.5
8	236.8	236.0
9	266.4	265.5

	294	293
1	29.4	29.3
2	58.8	58.6
3	88.2	87.9
4	117.6	117.2
5	147.0	146.5
6	176.4	175.8
7	205.8	205.1
8	235.2	234.4
9	264.6	263.7

	292	291
1	29.2	29.1
2	58.4	58.2
3	87.6	87.3
4	116.8	116.4
5	146.0	145.5
6	175.2	174.6
7	204.4	203.7
8	233.6	232.8
9	262.8	261.9

	290	289
1	29.0	28.9
2	58.0	57.8
3	87.0	86.7
4	116.0	115.6
5	145.0	144.5
6	174.0	173.4
7	203.0	202.3
8	232.0	231.2
9	261.0	260.1

P. P.

N.	0	1	2	3	4	5	6	7	8	9
1500	176 0913	1202	1492	1781	2071	2360	2649	2939	3228	3518
01	3807	4096	4386	4675̄	4964	5253	5543	5832	6121	6410
02	6699	6988	7278	7567	7856	8145̄	8434	8723	9012	9301
03	9590	9879	0̄168	0̄457	0̄745	1̄034	1̄323	1̄612	1̄901	2̄190
04	177 2478	2767	3056	3345̄	3633	3922	4211	4499	4788	5076
05	5365̄	5654	5942	6231	6519	6808	7096	7385̄	7673	7961
06	8250	8538	8826	9115̄	9403	9691	9980	0̄268	0̄556	0̄844
07	178 1133	1421	1709	1997	2285	2573	2861	3149	3437	3725
08	4013	4301	4589	4877	5165	5453	5741	6029	6317	6605̄
09	6892	7180	7468	7756	8043	8331	8619	8907	9194	9482
1510	9769	0̄057	0̄345̄	0̄632	0̄920	1̄207	1̄495̄	1̄782	2̄070	2̄357
11	179 2645̄	2932	3219	3507	3794	4082	4369	4656	4943	5231
12	5518	5805	6092	6380	6667	6954	7241	7528	7815	8102
13	8389	8676	8963	9250	9537	9824	0̄111	0̄398	0̄685	0̄972
14	180 1259	1546	1832	2119	2406	2693	2980	3266	3553	3840
15	4126	4413	4700	4986	5273	5559	5846	6133	6419	6706
16	6992	7278	7565̄	7851	8138	8424	8711	8997	9283	9570
17	9856	0̄142	0̄428	0̄715̄	1̄001	1̄287	1̄573	1̄859	2̄145	2̄432
18	181 2718	3004	3290	3576	3862	4148	4434	4720	5006	5292
19	5578	5864	6150	6435	6721	7007	7293	7579	7864	8150
1520	8436	8722	9007	9293	9579	9864	0̄150	0̄435	0̄721	1̄007
21	182 1292	1578	1863	2149	2434	2720	3005̄	3290	3576	3861
22	4147	4432	4717	5002	5288	5573	5858	6143	6429	6714
23	6999	7284	7569	7854	8140	8425̄	8710	8995̄	9280	9565̄
24	9850	0̄135̄	0̄420	0̄704	0̄989	1̄274	1̄559	1̄844	2̄129	2̄414
25	183 2698	2983	3268	3553	3837	4122	4407	4691	4976	5261
26	5545	5830	6114	6399	6684	6968	7253	7537	7822	8106
27	8390	8675̄	8959	9244	9528	9812	0̄096	0̄381	0̄665	0̄949
28	184 1234	1518	1802	2086	2370	2654	2939	3223	3507	3791
29	4075̄	4359	4643	4927	5211	5495̄	5779	6063	6347	6630
1530	6914	7198	7482	7766	8050	8333	8617	8901	9185̄	9468
31	9752	0̄036	0̄319	0̄603	0̄886	1̄170	1̄454	1̄737	2̄021	2̄304
32	185 2588	2871	3155̄	3438	3721	4005̄	4288	4572	4855̄	5138
33	5422	5705̄	5988	6271	6555̄	6838	7121	7404	7687	7970
34	8254	8537	8820	9103	9386	9669	9952	0̄235̄	0̄518	0̄801
35	186 1084	1367	1650	1932	2215	2498	2781	3064	3347	3629
36	3912	4195̄	4478	4760	5043	5326	5608	5891	6174	6456
37	6739	7021	7304	7586	7869	8151	8434	8716	8999	9281
38	9563	9846	0̄128	0̄410	0̄693	0̄975	1̄257	1̄540	1̄822	2̄104
39	187 2386	2668	2951	3233	3515̄	3797	4079	4361	4643	4925
1540	5207	5489	5771	6053	6335	6617	6899	7181	7463	7745̄
41	8026	8308	8590	8872	9154	9435	9717	9999	0̄280	0̄562
42	188 0844	1125	1407	1689	1970	2252	2533	2815̄	3096	3378
43	3659	3941	4222	4504	4785	5066	5348	5629	5910	6192
44	6473	6754	7035	7317	7598	7879	8160	8441	8723	9004
45	9285̄	9566	9847	0̄128	0̄409	0̄690	0̄971	1̄252	1̄533	1̄814
46	189 2095̄	2376	2657	2938	3218	3499	3780	4061	4342	4622
47	4903	5184	5465̄	5745	6026	6307	6587	6868	7148	7429
48	7710	7990	8271	8551	8832	9112	9393	9673	9953	0̄234
49	190 0514	0795̄	1075̄	1355	1636	1916	2196	2476	2757	3037
1550	3317	3597	3877	4157	4438	4718	4998	5278	5558	5838
N.	0	1	2	3	4	5	6	7	8	9

P. P.

	290	289
1	29.0	28.9
2	58.0	57.8
3	87.0	86.7
4	116.0	115.6
5	145.0	144.5
6	174.0	173.4
7	203.0	202.3
8	232.0	231.2
9	261.0	260.1

	288	287
1	28.8	28.7
2	57.6	57.4
3	86.4	86.1
4	115.2	114.8
5	144.0	143.5
6	172.8	172.2
7	201.6	200.9
8	230.4	229.6
9	259.2	258.3

	286	285
1	28.6	28.5
2	57.2	57.0
3	85.8	85.5
4	114.4	114.0
5	143.0	142.5
6	171.6	171.0
7	200.2	199.5
8	228.8	228.0
9	257.4	256.5

	284	283
1	28.4	28.3
2	56.8	56.6
3	85.2	84.9
4	113.6	113.2
5	142.0	141.5
6	170.4	169.8
7	198.8	198.1
8	227.2	226.4
9	255.6	254.7

	282	281
1	28.2	28.1
2	56.4	56.2
3	84.6	84.3
4	112.8	112.4
5	141.0	140.5
6	169.2	168.6
7	197.4	196.7
8	225.6	224.8
9	253.8	252.9

	280
1	28.0
2	56.0
3	84.0
4	112.0
5	140.0
6	168.0
7	196.0
8	224.0
9	252.0

P. P.

N.	0	1	2	3	4	5	6	7	8	9
1550	190 3317	3597	3877	4157	4438	4718	4998	5278	5558	5838
51	6118	6398	6678	6958	7238	7518	7798	8078	8357	8637
52	8917	9197	9477	9757	0̄036	0̄316	0̄596	0̄876	1̄155	1̄435̄
53	191 1715̄	1994	2274	2553	2833	3113	3392	3672	3951	4231
54	4510	4790	5069	5348	5628	5907	6187	6466	6745	7025̄
55	7304	7583	7862	8142	8421	8700	8979	9259	9538	9817
56	192 0096	0375	0654	0933	1212	1491	1770	2049	2328	2607
57	2886	3165	3444	3723	4002	4281	4559	4838	5117	5396
58	5675̄	5953	6232	6511	6789	7068	7347	7625	7904	8183
59	8461	8740	9018	9297	9575	9854	0̄132	0̄411	0̄689	0̄968
1560	193 1246	1524	1803	2081	2359	2638	2916	3194	3473	3751
61	4029	4307	4585	4864	5142	5420	5698	5976	6254	6532
62	6810	7088	7366	7644	7922	8200	8478	8756	9034	9312
63	9590	9868	0̄145	0̄423	0̄701	0̄979	1̄257	1̄534	1̄812	2̄090
64	194 2367	2645	2923	3200	3478	3756	4033	4311	4588	4866
65	5143	5421	5698	5976	6253	6531	6808	7086	7363	7640
66	7918	8195	8472	8749	9027	9304	9581	9858	0̄136	0̄413
67	195 0690	0967	1244	1521	1798	2075	2353	2630	2907	3184
68	3461	3738	4014	4291	4568	4845	5122	5399	5676	5953
69	6229	6506	6783	7060	7336	7613	7890	8167	8443	8720
1570	8997	9273	9550	9826	0̄103	0̄379	0̄656	0̄932	1̄209	1̄485
71	196 1762	2038	2315̄	2591	2867	3144	3420	3697	3973	4249
72	4525	4802	5078	5354	5630	5907	6183	6459	6735	7011
73	7287	7563	7839	8115	8391	8667	8943	9219	9495	9771
74	197 0047	0323	0599	0875̄	1151	1427	1702	1978	2254	2530
75	2806	3081	3357	3633	3908	4184	4460	4735	5011	5287
76	5562	5838	6113	6389	6664	6940	7215	7491	7766	8042
77	8317	8592	8868	9143	9418	9694	9969	0̄244	0̄520	0̄795̄
78	198 1070	1345	1620	1896	2171	2446	2721	2996	3271	3546
79	3821	4096	4371	4646	4921	5196	5471	5746	6021	6296
1580	6571	6846	7121	7395	7670	7945	8220	8495̄	8769	9044
81	9319	9593	9868	0̄143	0̄417	0̄692	0̄967	1̄241	1̄516	1̄790
82	199 2065̄	2339	2614	2888	3163	3437	3712	3986	4260	4535̄
83	4809	5083	5358	5632	5906	6181	6455̄	6729	7003	7278
84	7552	7826	8100	8374	8648	8922	9197	9471	9745̄	0̄019
85	200 0293	0567	0841	1115̄	1389	1662	1936	2210	2484	2758
86	3032	3306	3579	3853	4127	4401	4674	4948	5222	5496
87	5769	6043	6317	6590	6864	7137	7411	7684	7958	8231
88	8505̄	8778	9052	9325	9599	9872	0̄146	0̄419	0̄692	0̄966
89	201 1239	1512	1786	2059	2332	2605	2879	3152	3425̄	3698
1590	3971	4244	4517	4791	5064	5337	5610	5883	6156	6429
91	6702	6975̄	7248	7521	7794	8066	8339	8612	8885	9158
92	9431	9703	9976	0̄249	0̄522	0̄794	1̄067	1̄340	1̄612	1̄885
93	202 2158	2430	2703	2976	3248	3521	3793	4066	4338	4611
94	4883	5156	5428	5700	5973	6245	6518	6790	7062	7335̄
95	7607	7879	8151	8424	8696	8968	9240	9512	9785̄	0̄057
96	203 0329	0601	0873	1145	1417	1689	1961	2233	2505	2777
97	3049	3321	3593	3865̄	4137	4409	4681	4952	5224	5496
98	5768	6040	6311	6583	6855̄	7126	7398	7670	7941	8213
99	8485̄	8756	9028	9299	9571	9842	0̄114	0̄385	0̄657	0̄928
1600	204 1200	1471	1743	2014	2285	2557	2828	3099	3371	3642
N.	0	1	2	3	4	5	6	7	8	9

P. P.

	281	280
1	28.1	28.0
2	56.2	56.0
3	84.3	84.0
4	112.4	112.0
5	140.5	140.0
6	168.6	168.0
7	196.7	196.0
8	224.8	224.0
9	252.9	258.0

	279	278
1	27.9	27.8
2	55.8	55.6
3	83.7	83.4
4	111.6	111.2
5	139.5	139.0
6	167.4	166.8
7	195.3	194.6
8	223.2	222.4
9	251.1	250.2

	277	276
1	27.7	27.6
2	55.4	55.2
3	83.1	82.8
4	110.8	110.4
5	138.5	138.0
6	166.2	165.6
7	193.9	193.2
8	221.6	220.8
9	249.3	248.4

	275	274
1	27.5	27.4
2	55.0	54.8
3	82.5	82.2
4	110.0	109.6
5	137.5	137.0
6	165.0	164.4
7	192.5	191.8
8	220.0	219.2
9	247.5	246.6

	273	272
1	27.3	27.2
2	54.6	54.4
3	81.9	81.6
4	109.2	108.8
5	136.5	136.0
6	163.8	163.2
7	191.1	190.4
8	218.4	217.6
9	245.7	244.8

	271
1	27.1
2	54.2
3	81.3
4	108.4
5	135.5
6	162.6
7	189.7
8	216.8
9	243.9

P. P.

N.	0	1	2	3	4	5	6	7	8	9
1600	204 1200	1471	1743	2014	2285	2557	2828	3099	3371	3642
01	3913	4185̄	4456	4727	4998	5269	5541	5812	6083	6354
02	6625	6896	7167	7438	7709	7980	8251	8522	8793	9064
03	9335	9606	9877	0̄148	0̄419	0̄690	0̄960	1̄231	1̄502	1̄773
04	205 2044	2314	2585	2856	3127	3397	3668	3939	4209	4480
05	4750	5021	5292	5562	5833	6103	6374	6644	6915̄	7185̄
06	7455	7726	7996	8267	8537	8807	9078	9348	9618	9889
07	206 0159	0429	0699	0969	1240	1510	1780	2050	2320	2590
08	2860	3131	3401	3671	3941	4211	4481	4751	5021	5291
09	5560	5830	6100	6370	6640	6910	7180	7449	7719	7989
1610	8259	8529	8798	9068	9338	9607	9877	0̄147	0̄416	0̄686
11	207 0955	1225̄	1495̄	1764	2034	2303	2573	2842	3112	3381
12	3650	3920	4189	4459	4728	4997	5267	5536	5805	6074
13	6344	6613	6882	7151	7421	7690	7959	8228	8497	8766
14	9035	9304	9573	9842	0̄111	0̄380	0̄649	0̄918	1̄187	1̄456
15	208 1725	1994	2263	2532	2801	3070	3338	3607	3876	4145̄
16	4414	4682	4951	5220	5488	5757	6026	6294	6563	6832
17	7100	7369	7637	7906	8174	8443	8711	8980	9248	9517
18	9785	0̄054	0̄322	0̄590	0̄859	1̄127	1̄395	1̄664	1̄932	2̄200
19	209 2468	2737	3005̄	3273	3541	3810	4078	4346	4614	4882
1620	5150	5418	5686	5954	6222	6490	6758	7026	7294	7562
21	7830	8098	8366	8634	8902	9170	9437	9705	9973	0̄241
22	210 0508	0776	1044	1312	1579	1847	2115̄	2382	2650	2918
23	3185	3453	3720	3988	4255	4523	4790	5058	5325	5593
24	5860	6128	6395	6662	6930	7197	7464	7732	7999	8266
25	8534	8801	9068	9335	9603	9870	0̄137	0̄404	0̄671	0̄938
26	211 1205	1472	1740	2007	2274	2541	2808	3075̄	3342	3609
27	3876	4142	4409	4676	4943	5210	5477	5744	6010	6277
28	6544	6811	7078	7344	7611	7878	8144	8411	8678	8944
29	9211	9477	9744	0̄011	0̄277	0̄544	0̄810	1̄077	1̄343	1̄610
1630	212 1876	2142	2409	2675	2942	3208	3474	3741	4007	4273
31	4540	4806	5072	5338	5605̄	5871	6137	6403	6669	6935
32	7202	7468	7734	8000	8266	8532	8798	9064	9330	9596
33	9862	0̄128	0̄394	0̄660	0̄926	1̄191	1̄457	1̄723	1̄989	2̄255̄
34	213 2521	2786	3052	3318	3584	3849	4115̄	4381	4646	4912
35	5178	5443	5709	5974	6240	6505	6771	7037	7302	7568
36	7833	8098	8364	8629	8895̄	9160	9425	9691	9956	0̄221
37	214 0487	0752	1017	1283	1548	1813	2078	2343	2609	2874
38	3139	3404	3669	3934	4199	4464	4730	4995̄	5260	5525̄
39	5790	6055̄	6319	6584	6849	7114	7379	7644	7909	8174
1640	8438	8703	8968	9233	9498	9762	0̄027	0̄292	0̄556	0̄821
41	215 1086	1350	1615	1880	2144	2409	2673	2938	3203	3467
42	3732	3996	4260	4525̄	4789	5054	5318	5583	5847	6111
43	6376	6640	6904	7169	7433	7697	7961	8226	8490	8754
44	9018	9282	9546	9811	0̄075̄	0̄339	0̄603	0̄867	1̄131	1̄395
45	216 1659	1923	2187	2451	2715̄	2979	3243	3507	3771	4034
46	4298	4562	4826	5090	5354	5617	5881	6145̄	6409	6672
47	6936	7200	7463	7727	7991	8254	8518	8781	9045̄	9309
48	9572	9836	0̄099	0̄363	0̄626	0̄890	1̄153	1̄416	1̄680	1̄943
49	217 2207	2470	2733	2997	3260	3523	3786	4050	4313	4576
1650	4839	5103	5366	5629	5892	6155	6418	6682	6945̄	7208
N.	0	1	2	3	4	5	6	7	8	9

P. P.

	272	271
1	27.2	27.1
2	54.4	54.2
3	81.6	81.3
4	108.8	108.4
5	136.0	135.5
6	163.2	162.6
7	190.4	189.7
8	217.6	216.8
9	244.8	243.9

	270	269
1	27.0	26.9
2	54.0	53.8
3	81.0	80.7
4	108.0	107.6
5	135.0	134.5
6	162.0	161.4
7	189.0	188.3
8	216.0	215.2
9	243.0	242.1

	268	267
1	26.8	26.7
2	53.6	53.4
3	80.4	80.1
4	107.2	106.8
5	134.0	133.5
6	160.8	160.2
7	187.6	186.9
8	214.4	213.6
9	241.2	240.3

	266	265
1	26.6	26.5
2	53.2	53.0
3	79.8	79.5
4	106.4	106.0
5	133.0	132.5
6	159.6	159.0
7	186.2	185.5
8	212.8	212.0
9	239.4	238.5

	264	263
1	26.4	26.3
2	52.8	52.6
3	79.2	78.9
4	105.6	105.2
5	132.0	131.5
6	158.4	157.8
7	184.8	184.1
8	211.2	210.4
9	237.6	236.7

P. P.

1650 — 1700

N.	0	1	2	3	4	5	6	7	8	9
1650	217 4839	5103	5366	5629	5892	6155	6418	6682	6945	7208
51	7471	7734	7997	8260	8523	8786	9049	9312	9575̄	9838
52	218 0100	0363	0626	0889	1152	1415̄	1677	1940	2203	2466
53	2729	2991	3254	3517	3779	4042	4305̄	4567	4830	5092
54	5355	5618	5880	6143	6405	6668	6930	7193	7455	7718
55	7980	8242	8505̄	8767	9030	9292	9554	9816	0̄079	0̄341
56	219 0603	0866	1128	1390	1652	1914	2177	2439	2701	2963
57	3225	3487	3749	4011	4273	4535	4797	5059	5321	5583
58	5845	6107	6369	6631	6893	7155	7417	7678	7940	8202
59	8464	8726	8987	9249	9511	9773	0̄034	0̄296	0̄558	0̄819
1660	220 1081	1342	1604	1866	2127	2389	2650	2912	3173	3435̄
61	3696	3958	4219	4481	4742	5003	5265̄	5526	5788	6049
62	6310	6571	6833	7094	7355	7617	7878	8139	8400	8661
63	8922	9184	9445̄	9706	9967	0̄228	0̄489	0̄750	1̄011	1̄272
64	221 1533	1794	2055	2316	2577	2838	3099	3360	3621	3882
65	4142	4403	4664	4925̄	5186	5446	5707	5968	6229	6489
66	6750	7011	7271	7532	7793	8053	8314	8574	8835̄	9095
67	9356	9617	9877	0̄138	0̄398	0̄658	0̄919	1̄179	1̄440	1̄700
68	222 1960	2221	2481	2741	3002	3262	3522	3783	4043	4303
69	4563	4824	5084	5344	5604	5864	6124	6384	6645̄	6905̄
1670	7165̄	7425̄	7685̄	7945̄	8205̄	8465̄	8725̄	8985̄	9245̄	9505̄
71	9764	0̄024	0̄284	0̄544	0̄804	1̄064	1̄324	1̄583	1̄843	2̄103
72	223 2363	2622	2882	3142	3402	3661	3921	4181	4440	4700
73	4959	5219	5479	5738	5998	6257	6517	6776	7036	7295
74	7555̄	7814	8073	8333	8592	8852	9111	9370	9630	9889
75	224 0148	0407	0667	0926	1185	1444	1704	1963	2222	2481
76	2740	2999	3258	3517	3777	4036	4295̄	4554	4813	5072
77	5331	5590	5849	6107	6366	6625	6884	7143	7402	7661
78	7920	8178	8437	8696	8955̄	9213	9472	9731	9990	0̄248
79	225 0507	0766	1024	1283	1541	1800	2059	2317	2576	2834
1680	3093	3351	3610	3868	4127	4385	4644	4902	5160	5419
81	5677	5935	6194	6452	6710	6969	7227	7485	7743	8002
82	8260	8518	8776	9034	9293	9551	9809	0̄067	0̄325	0̄583
83	226 0841	1099	1357	1615	1873	2131	2389	2647	2905	3163
84	3421	3679	3937	4194	4452	4710	4968	5226	5484	5741
85	5999	6257	6515̄	6772	7030	7288	7545	7803	8060	8318
86	8576	8833	9091	9348	9606	9863	0̄121	0̄378	0̄636	0̄893
87	227 1151	1408	1666	1923	2180	2438	2695	2953	3210	3467
88	3724	3982	4239	4496	4753	5011	5268	5525	5782	6039
89	6296	6554	6811	7068	7325̄	7582	7839	8096	8353	8610
1690	8867	9124	9381	9638	9895	0̄152	0̄409	0̄666	0̄922	1̄179
91	228 1436	1693	1950	2206	2463	2720	2977	3233	3490	3747
92	4004	4260	4517	4774	5030	5287	5543	5800	6057	6313
93	6570	6826	7083	7339	7596	7852	8108	8365̄	8621	8878
94	9134	9390	9647	9903	0̄159	0̄416	0̄672	0̄928	1̄185̄	1̄441
95	229 1697	1953	2209	2466	2722	2978	3234	3490	3746	4002
96	4258	4515̄	4771	5027	5283	5539	5795̄	6051	6307	6562
97	6818	7074	7330	7586	7842	8098	8354	8609	8865	9121
98	9377	9633	9888	0̄144	0̄400	0̄656	0̄911	1̄167	1̄423	1̄678
99	230 1934	2189	2445̄	2701	2956	3212	3467	3723	3978	4234
1700	4489	4745̄	5000	5256	5511	5766	6022	6277	6532	6788
N.	0	1	2	3	4	5	6	7	8	9

P. P.

	264	263
1	26.4	26.3
2	52.8	52.6
3	79.2	78.9
4	105.6	105.2
5	132.0	131.5
6	158.4	157.8
7	184.8	184.1
8	211.2	210.4
9	237.6	236.7

	262	261
1	26.2	26.1
2	52.4	52.2
3	78.6	78.3
4	104.8	104.4
5	131.0	130.5
6	157.2	156.6
7	183.4	182.7
8	209.6	208.8
9	235.8	234.9

	260	259
1	26.0	25.9
2	52.0	51.8
3	78.0	77.7
4	104.0	103.6
5	130.0	129.5
6	156.0	155.4
7	182.0	181.3
8	208.0	207.2
9	234.0	233.1

	258	257
1	25.8	25.7
2	51.6	51.4
3	77.4	77.1
4	103.2	102.8
5	129.0	128.5
6	154.8	154.2
7	180.6	179.9
8	206.4	205.6
9	232.2	231.3

	256	255
1	25.6	25.5
2	51.2	51.0
3	76.8	76.5
4	102.4	102.0
5	128.0	127.5
6	153.6	153.0
7	179.2	178.5
8	204.8	204.0
9	230.4	229.5

P. P.

1700 — 1750

N.	0	1	2	3	4	5	6	7	8	9
1700	230 4489	4745̄	5000	5256	5511	5766	6022	6277	6532	6788
01	7043	7298	7554	7809	8064	8320	8575̄	8830	9085	9340
02	9596	9851	0̄106	0̄361	0̄616	0̄871	1̄126	1̄381	1̄636	1̄891
03	231 2146	2401	2656	2911	3166	3421	3676	3931	4186	4441
04	4696	4951	5206	5460	5715	5970	6225̄	6480	6734	6989
05	7244	7499	7753	8008	8263	8517	8772	9026	9281	9536
06	9790	0̄045̄	0̄299	0̄554	0̄808	1̄063	1̄317	1̄572	1̄826	2̄081
07	232 2335	2590	2844	3098	3353	3607	3861	4116	4370	4624
08	4879	5133	5387	5641	5896	6150	6404	6658	6912	7166
09	7421	7675̄	7929	8183	8437	8691	8945	9199	9453	9707
1710	9961	0̄215	0̄469	0̄723	0̄977	1̄231	1̄485̄	1̄739	1̄992	2̄246
11	233 2500	2754	3008	3262	3515	3769	4023	4277	4530	4784
12	5038	5291	5545̄	5799	6052	6306	6559	6813	7067	7320
13	7574	7827	8081	8334	8588	8841	9095̄	9348	9601	9855̄
14	234 0108	0362	0615̄	0868	1122	1375̄	1628	1881	2135̄	2388
15	2641	2894	3148	3401	3654	3907	4160	4414	4667	4920
16	5173	5426	5679	5932	6185	6438	6691	6944	7197	7450
17	7703	7956	8209	8462	8715̄	8967	9220	9473	9726	9979
18	235 0232	0484	0737	0990	1243	1495	1748	2001	2253	2506
19	2759	3011	3264	3517	3769	4022	4274	4527	4779	5032
1720	5284	5537	5789	6042	6294	6547	6799	7052	7304	7556
21	7809	8061	8313	8566	8818	9070	9323	9575̄	9827	0̄079
22	236 0331	0584	0836	1088	1340	1592	1844	2097	2349	2601
23	2853	3105̄	3357	3609	3861	4113	4365̄	4617	4869	5121
24	5373	5625̄	5876	6128	6380	6632	6884	7136	7387	7639
25	7891	8143	8394	8646	8898	9150	9401	9653	9905̄	0̄156
26	237 0408	0660	0911	1163	1414	1666	1917	2169	2420	2672
27	2923	3175̄	3426	3678	3929	4181	4432	4683	4935̄	5186
28	5437	5689	5940	6191	6443	6694	6945	7196	7448	7699
29	7950	8201	8452	8703	8955̄	9206	9457	9708	9959	0̄210
1730	238 0461	0712	0963	1214	1465	1716	1967	2218	2469	2720
31	2971	3222	3472	3723	3974	4225̄	4476	4727	4977	5228
32	5479	5730	5980	6231	6482	6732	6983	7234	7484	7735
33	7986	8236	8487	8737	8988	9238	9489	9739	9990	0̄240
34	239 0491	0741	0992	1242	1493	1743	1993	2244	2494	2744
35	2995̄	3245	3495	3746	3996	4246	4496	4747	4997	5247
36	5497	5747	5998	6248	6498	6748	6998	7248	7498	7748
37	7998	8248	8498	8748	8998	9248	9498	9748	9998	0̄248
38	240 0498	0748	0997	1247	1497	1747	1997	2247	2496	2746
39	2996	3246	3495	3745̄	3995̄	4244	4494	4744	4993	5243
1740	5492	5742	5992	6241	6491	6740	6990	7239	7489	7738
41	7988	8237	8487	8736	8985	9235̄	9484	9734	9983	0̄232
42	241 0482	0731	0980	1229	1479	1728	1977	2226	2476	2725̄
43	2974	3223	3472	3721	3970	4220	4469	4718	4967	5216
44	5465̄	5714	5963	6212	6461	6710	6959	7208	7457	7705
45	7954	8203	8452	8701	8950	9199	9447	9696	9945̄	0̄194
46	242 0442	0691	0940	1189	1437	1686	1935̄	2183	2432	2680
47	2929	3178	3426	3675̄	3923	4172	4420	4669	4917	5166
48	5414	5663	5911	6160	6408	6656	6905̄	7153	7401	7650
49	7898	8146	8395̄	8643	8891	9139	9388	9636	9884	0̄132
1750	243 0380	0629	0877	1125̄	1373	1621	1869	2117	2365	2613
N.	0	1	2	3	4	5	6	7	8	9

P. P.

	256	255
1	25.6	25.5
2	51.2	51.0
3	76.8	76.5
4	102.4	102.0
5	128.0	127.5
6	153.6	153.0
7	179.2	178.5
8	204.8	204.0
9	230.4	229.5

	254	253
1	25.4	25.3
2	50.8	50.6
3	76.2	75.9
4	101.6	101.2
5	127.0	126.5
6	152.4	151.8
7	177.8	177.1
8	203.2	202.4
9	228.6	227.7

	252	251
1	25.2	25.1
2	50.4	50.2
3	75.6	75.3
4	100.8	100.4
5	126.0	125.5
6	151.2	150.6
7	176.4	175.7
8	201.6	200.8
9	226.8	225.9

	250	249
1	25.0	24.9
2	50.0	49.8
3	75.0	74.7
4	100.0	99.6
5	125.0	124.5
6	150.0	149.4
7	175.0	174.3
8	200.0	199.2
9	225.0	224.1

	248
1	24.8
2	49.6
3	74.4
4	99.2
5	124.0
6	148.8
7	173.6
8	198.4
9	223.2

P. P.

N.	0	1	2	3	4	5	6	7	8	9
1750	243 0380	0629	0877	1125̄	1373	1621	1869	2117	2365	2613
51	2861	3109	3357	3605	3853	4101	4349	4597	4845	5093
52	5341	5589	5837	6085̄	6332	6580	6828	7076	7324	7571
53	7819	8067	8315̄	8562	8810	9058	9305	9553	9801	0̄048
54	244 0296	0543	0791	1039	1286	1534	1781	2029	2276	2524
55	2771	3019	3266	3514	3761	4008	4256	4503	4750	4998
56	5245	5492	5740	5987	6234	6482	6729	6976	7223	7470
57	7718	7965̄	8212	8459	8706	8953	9200	9448	9695̄	9942
58	245 0189	0436	0683	0930	1177	1424	1671	1918	2165̄	2411
59	2658	2905	3152	3399	3646	3893	4140	4386	4633	4880
1760	5127	5373	5620	5867	6114	6360	6607	6854	7100	7347
61	7594	7840	8087	8333	8580	8826	9073	9320	9566	9813
62	246 0059	0306	0552	0798	1045̄	1291	1538	1784	2030	2277
63	2523	2769	3016	3262	3508	3755̄	4001	4247	4493	4740
64	4986	5232	5478	5724	5970	6217	6463	6709	6955̄	7201
65	7447	7693	7939	8185	8431	8677	8923	9169	9415	9661
66	9907	0̄153	0̄399	0̄645̄	0̄891	1̄136	1̄382	1̄628	1̄874	2̄120
67	247 2365	2611	2857	3103	3349	3594	3840	4086	4331	4577
68	4823	5068	5314	5559	5805	6051	6296	6542	6787	7033
69	7278	7524	7769	8015̄	8260	8506	8751	8997	9242	9487
1770	9733	9978	0̄223	0̄469	0̄714	0̄959	1̄205̄	1̄450	1̄695	1̄940
71	248 2186	2431	2676	2921	3166	3412	3657	3902	4147	4392
72	4637	4882	5127	5372	5617	5862	6107	6352	6597	6842
73	7087	7332	7577	7822	8067	8312	8557	8802	9047	9291
74	9536	9781	0̄026	0̄271	0̄515	0̄760	1̄005̄	1̄249	1̄494	1̄739
75	249 1984	2228	2473	2718	2962	3207	3451	3696	3941	4185
76	4430	4674	4919	5163	5408	5652	5897	6141	6385	6630
77	6874	7119	7363	7607	7852	8096	8340	8585̄	8829	9073
78	9318	9562	9806	0̄050	0̄294	0̄539	0̄783	1̄027	1̄271	1̄515
79	250 1759	2004	2248	2492	2736	2980	3224	3468	3712	3956
1780	4200	4444	4688	4932	5176	5420	5664	5908	6151	6395
81	6639	6883	7127	7371	7614	7858	8102	8346	8590	8833
82	9077	9321	9564	9808	0̄052	0̄295	0̄539	0̄783	1̄026	1̄270
83	251 1513	1757	2001	2244	2488	2731	2975̄	3218	3462	3705
84	3949	4192	4435	4679	4922	5166	5409	5652	5896	6139
85	6382	6625	6869	7112	7355	7599	7842	8085̄	8328	8571
86	8815̄	9058	9301	9544	9787	0̄030	0̄273	0̄516	0̄759	1̄002
87	252 1246	1489	1732	1975̄	2218	2461	2703	2946	3189	3432
88	3675	3918	4161	4404	4647	4889	5132	5375	5618	5861
89	6103	6346	6589	6832	7074	7317	7560	7802	8045	8288
1790	8530	8773	9016	9258	9501	9743	9986	0̄228	0̄471	0̄713
91	253 0956	1198	1441	1683	1926	2168	2411	2653	2895	3138
92	3380	3622	3865̄	4107	4349	4592	4834	5076	5318	5561
93	5803	6045	6287	6529	6772	7014	7256	7498	7740	7982
94	8224	8466	8709	8951	9193	9435̄	9677	9919	0̄161	0̄403
95	254 0645̄	0886	1128	1370	1612	1854	2096	2338	2580	2822
96	3063	3305	3547	3789	4030	4272	4514	4756	4997	5239
97	5481	5722	5964	6206	6447	6689	6931	7172	7414	7655
98	7897	8138	8380	8621	8863	9104	9346	9587	9829	0̄070
99	255 0312	0553	0794	1036	1277	1519	1760	2001	2242	2484
1800	2725	2966	3208	3449	3690	3931	4172	4414	4655̄	4896
N.	0	1	2	3	4	5	6	7	8	9

P. P.

	249	248
1	24.9	24.8
2	49.8	49.6
3	74.7	74.4
4	99.6	99.2
5	124.5	124.0
6	149.4	148.8
7	174.3	173.6
8	199.2	198.4
9	224.1	223.2

	247	246
1	24.7	24.6
2	49.4	49.2
3	74.1	73.8
4	98.8	98.4
5	123.5	123.0
6	148.2	147.6
7	172.9	172.2
8	197.6	196.8
9	222.3	221.4

	245	244
1	24.5	24.4
2	49.0	48.8
3	73.5	73.2
4	98.0	97.6
5	122.5	122.0
6	147.0	146.4
7	171.5	170.8
8	196.0	195.2
9	220.5	219.6

	243	242
1	24.3	24.2
2	48.6	48.4
3	72.9	72.6
4	97.2	96.8
5	121.5	121.0
6	145.8	145.2
7	170.1	169.4
8	194.4	193.6
9	218.7	217.8

	241
1	24.1
2	48.2
3	72.3
4	96.4
5	120.5
6	144.6
7	168.7
8	192.8
9	216.9

P. P.

N.	0	1	2	3	4	5	6	7	8	9
1800	255 2725	2966	3208	3449	3690	3931	4172	4414	4655̄	4896
01	5137	5378	5619	5860	6102	6343	6584	6825̄	7066	7307
02	7548	7789	8030	8271	8512	8753	8994	9235̄	9475	9716
03	9957	0198	0̄439	0̄680	0̄921	1̄161	1̄402	1̄643	1̄884	2̄125̄
04	256 2365	2606	2847	3087	3328	3569	3810	4050	4291	4531
05	4772	5013	5253	5494	5734	5975̄	6215	6456	6696	6937
06	7177	7418	7658	7899	8139	8380	8620	8860	9101	9341
07	9582	9822	0̄062	0̄302	0̄543	0̄783	1̄023	1̄264	1̄504	1̄744
08	257 1984	2224	2465̄	2705̄	2945̄	3185	3425	3665	3905	4146
09	4386	4626	4866	5106	5346	5586	5826	6066	6306	6546
1810	6786	7026	7266	7506	7745	7985	8225	8465	8705̄	8945̄
11	9185̄	9424	9664	9904	0̄144	0̄383	0̄623	0̄863	1̄103	1̄342
12	258 1582	1822	2061	2301	2541	2780	3020	3259	3499	3738
13	3978	4218	4457	4697	4936	5176	5415	5655̄	5894	6133
14	6373	6612	6852	7091	7330	7570	7809	8048	8288	8527
15	8766	9006	9245̄	9484	9723	9963	0̄202	0̄441	0̄680	0̄919
16	259 1158	1398	1637	1876	2115̄	2354	2593	2832	3071	3310
17	3549	3788	4027	4266	4505	4744	4983	5222	5461	5700
18	5939	6178	6417	6655	6894	7133	7372	7611	7849	8088
19	8327	8566	8804	9043	9282	9521	9759	9998	0̄237	0̄475
1820	260 0714	0952	1191	1430	1668	1907	2145	2384	2622	2861
21	3099	3338	3576	3815̄	4053	4292	4530	4769	5007	5245
22	5484	5722	5960	6199	6437	6675	6914	7152	7390	7628
23	7867	8105̄	8343	8581	8820	9058	9296	9534	9772	0̄010
24	261 0248	0486	0725̄	0963	1201	1439	1677	1915̄	2153	2391
25	2629	2867	3105̄	3343	3580	3818	4056	4294	4532	4770
26	5008	5246	5483	5721	5959	6197	6435̄	6672	6910	7148
27	7385	7623	7861	8099	8336	8574	8811	9049	9287	9524
28	9762	9999	0̄237	0̄475̄	0̄712	0̄950	1̄187	1̄425̄	1̄662	1̄900
29	262 2137	2374	2612	2849	3087	3324	3562	3799	4036	4274
1830	4511	4748	4986	5223	5460	5697	5935̄	6172	6409	6646
31	6883	7121	7358	7595̄	7832	8069	8306	8543	8781	9018
32	9255̄	9492	9729	9966	0̄203	0̄440	0̄677	0̄914	1̄151	1̄388
33	263 1625̄	1862	2098	2335	2572	2809	3046	3283	3520	3757
34	3993	4230	4467	4704	4940	5177	5414	5651	5887	6124
35	6361	6597	6834	7071	7307	7544	7780	8017	8254	8490
36	8727	8963	9200	9436	9673	9909	0̄146	0̄382	0̄619	0̄855
37	264 1092	1328	1564	1801	2037	2273	2510	2746	2982	3219
38	3455	3691	3928	4164	4400	4636	4873	5109	5345̄	5581
39	5817	6053	6290	6526	6762	6998	7234	7470	7706	7942
1840	8178	8414	8650	8886	9122	9358	9594	9830	0̄066	0̄302
41	265 0538	0774	1010	1246	1481	1717	1953	2189	2425̄	2660
42	2896	3132	3368	3604	3839	4075̄	4311	4546	4782	5018
43	5253	5489	5725̄	5960	6196	6431	6667	6903	7138	7374
44	7609	7845̄	8080	8316	8551	8787	9022	9257	9493	9728
45	9964	0̄199	0̄434	0̄670	0̄905	1̄140	1̄376	1̄611	1̄846	2̄082
46	266 2317	2552	2787	3023	3258	3493	3728	3963	4199	4434
47	4669	4904	5139	5374	5609	5844	6080	6315̄	6550	6785̄
48	7020	7255̄	7490	7725̄	7960	8195̄	8429	8664	8899	9134
49	9369	9604	9839	0̄074	0̄309	0̄543	0̄778	1̄013	1̄248	1̄483
1850	267 1717	1952	2187	2421	2656	2891	3126	3360	3595̄	3830
N.	0	1	2	3	4	5	6	7	8	9

P. P.

	242	241
1	24.2	24.1
2	48.4	48.2
3	72.6	72.3
4	96.8	96.4
5	121.0	120.5
6	145.2	144.6
7	169.4	168.7
8	193.6	192.8
9	217.8	216.9

	240	239
1	24.0	23.9
2	48.0	47.8
3	72.0	71.7
4	96.0	95.6
5	120.0	119.5
6	144.0	143.4
7	168.0	167.3
8	192.0	191.2
9	216.0	215.1

	238	237
1	23.8	23.7
2	47.6	47.4
3	71.4	71.1
4	95.2	94.8
5	119.0	118.5
6	142.8	142.2
7	166.6	165.9
8	190.4	189.6
9	214.2	213.3

	236	235
1	23.6	23.5
2	47.2	47.0
3	70.8	70.5
4	94.4	94.0
5	118.0	117.5
6	141.6	141.0
7	165.2	164.5
8	188.8	188.0
9	212.4	211.5

P. P.

N.	0	1	2	3	4	5	6	7	8	9
1850	267 1717	1952	2187	2421	2656	2891	3126	3360	3595̄	3830
51	4064	4299	4533	4768	5003	5237	5472	5706	5941	6175
52	6410	6644	6879	7113	7348	7582	7817	8051	8285	8520
53	8754	8989	9223	9457	9692	9926	0̄160	0̄394	0̄629	0̄863
54	268 1097	1332	1566	1800	2034	2268	2503	2737	2971	3205
55	3439	3673	3907	4141	4376	4610	4844	5078	5312	5546
56	5780	6014	6248	6482	6716	6950	7183	7417	7651	7885
57	8119	8353	8587	8821	9054	9288	9522	9756	9990	0̄223
58	269 0457	0691	0925̄	1158	1392	1626	1859	2093	2327	2560
59	2794	3028	3261	3495̄	3728	3962	4195	4429	4662	4896
1860	5129	5363	5596	5830	6063	6297	6530	6764	6997	7230
61	7464	7697	7930	8164	8397	8630	8864	9097	9330	9564
62	9797	0̄030	0̄263	0̄496	0̄730	0̄963	1̄196	1̄429	1̄662	1̄895
63	270 2129	2362	2595̄	2828	3061	3294	3527	3760	3993	4226
64	4459	4692	4925	5158	5391	5624	5857	6090	6323	6555
65	6788	7021	7254	7487	7720	7953	8185	8418	8651	8884
66	9116	9349	9582	9815̄	0̄047	0̄280	0̄513	0̄745	0̄978	1̄211
67	271 1443	1676	1908	2141	2374	2606	2839	3071	3304	3536
68	3769	4001	4234	4466	4699	4931	5163	5396	5628	5861
69	6093	6325	6558	6790	7022	7255̄	7487	7719	7952	8184
1870	8416	8648	8881	9113	9345̄	9577	9809	0̄041	0̄274	0̄506
71	272 0738	0970	1202	1434	1666	1898	2130	2362	2594	2826
72	3058	3290	3522	3754	3986	4218	4450	4682	4914	5146
73	5378	5610	5841	6073	6305	6537	6769	7001	7232	7464
74	7696	7928	8159	8391	8623	8854	9086	9318	9549	9781
75	273 0013	0244	0476	0708	0939	1171	1402	1634	1865	2097
76	2328	2560	2791	3023	3254	3486	3717	3949	4180	4411
77	4643	4874	5105	5337	5568	5799	6031	6262	6493	6725̄
78	6956	7187	7418	7650	7881	8112	8343	8574	8806	9037
79	9268	9499	9730	9961	0̄192	0̄423	0̄654	0̄885	1̄116	1̄347
1880	274 1578	1809	2040	2271	2502	2733	2964	3195	3426	3657
81	3888	4119	4350	4581	4811	5042	5273	5504	5735̄	5965
82	6196	6427	6658	6888	7119	7350	7581	7811	8042	8273
83	8503	8734	8964	9195	9426	9656	9887	0̄117	0̄348	0̄578
84	275 0809	1039	1270	1500	1731	1961	2192	2422	2653	2883
85	3114	3344	3574	3805̄	4035	4265	4496	4726	4956	5187
86	5417	5647	5877	6108	6338	6568	6798	7028	7259	7489
87	7719	7949	8179	8409	8640	8870	9100	9330	9560	9790
88	276 0020	0250	0480	0710	0940	1170	1400	1630	1860	2090
89	2320	2549	2779	3009	3239	3469	3699	3929	4158	4388
1890	4618	4848	5078	5307	5537	5767	5997	6226	6456	6686
91	6915	7145̄	7375̄	7604	7834	8063	8293	8523	8752	8982
92	9211	9441	9670	9900	0̄129	0̄359	0̄588	0̄818	1̄047	1̄277
93	277 1506	1736	1965̄	2194	2424	2653	2882	3112	3341	3570
94	3800	4029	4258	4488	4717	4946	5175	5405̄	5634	5863
95	6092	6321	6550	6780	7009	7238	7467	7696	7925	8154
96	8383	8612	8841	9070	9299	9528	9757	9986	0̄215	0̄444
97	278 0673	0902	1131	1360	1589	1818	2047	2276	2504	2733
98	2962	3191	3420	3648	3877	4106	4335̄	4564	4792	5021
99	5250	5478	5707	5936	6164	6393	6622	6850	7079	7307
1900	7536	7765̄	7993	8222	8450	8679	8907	9136	9364	9593
N.	0	1	2	3	4	5	6	7	8	9

P. P.

	235	234
1	23.5	23.4
2	47.0	46.8
3	70.5	70.2
4	94.0	93.6
5	117.5	117.0
6	141.0	140.4
7	164.5	163.8
8	188.0	187.2
9	211.5	210.6

	233	232
1	23.3	23.2
2	46.6	46.4
3	69.9	69.6
4	93.2	92.8
5	116.5	116.0
6	139.8	139.2
7	163.1	162.4
8	186.4	185.6
9	209.7	208.8

	231	230
1	23.1	23.0
2	46.2	46.0
3	69.3	69.0
4	92.4	92.0
5	115.5	115.0
6	138.6	138.0
7	161.7	161.0
8	184.8	184.0
9	207.9	207.0

	229	228
1	22.9	22.8
2	45.8	45.6
3	68.7	68.4
4	91.6	91.2
5	114.5	114.0
6	137.4	136.8
7	160.3	159.6
8	183.2	182.4
9	206.1	205.2

P. P.

N.	0	1	2	3	4	5	6	7	8	9
1900	278 7536	7765̅	7993	8222	8450	8679	8907	9136	9364	9593
01	9821	0̅050	0̅278	0̅506	0̅735̅	0̅963	1̅192	1̅420	1̅648	1̅877
02	279 2105	2333	2562	2790	3018	3247	3475̅	3703	3931	4160
03	4388	4616	4844	5072	5301	5529	5757	5985	6213	6441
04	6669	6898	7126	7354	7582	7810	8038	8266	8494	8722
05	8950	9178	9406	9634	9862	0̅090	0̅317	0̅545	0̅773	1̅001
06	280 1229	1457	1685̅	1912	2140	2368	2596	2824	3051	3279
07	3507	3735̅	3962	4190	4418	4645	4873	5101	5328	5556
08	5784	6011	6239	6467	6694	6922	7149	7377	7604	7832
09	8059	8287	8514	8742	8969	9197	9424	9651	9879	0̅106
1910	281 0334	0561	0788	1016	1243	1470	1698	1925	2152	2380
11	2607	2834	3061	3289	3516	3743	3970	4197	4425̅	4652
12	4879	5106	5333	5560	5787	6014	6242	6469	6696	6923
13	7150	7377	7604	7831	8058	8285̅	8512	8739	8966	9192
14	9419	9646	9873	0̅100	0̅327	0̅554	0̅781	1̅007	1̅234	1̅461
15	282 1688	1915̅	2141	2368	2595̅	2822	3048	3275̅	3502	3728
16	3955	4182	4408	4635̅	4862	5088	5315̅	5541	5768	5995̅
17	6221	6448	6674	6901	7127	7354	7580	7807	8033	8260
18	8486	8712	8939	9165	9392	9618	9844	0̅071	0̅297	0̅523
19	283 0750	0976	1202	1429	1655̅	1881	2107	2334	2560	2786
1920	3012	3238	3465̅	3691	3917	4143	4369	4595	4821	5048
21	5274	5500	5726	5952	6178	6404	6630	6856	7082	7308
22	7534	7760	7986	8212	8438	8663	8889	9115	9341	9567
23	9793	0̅019	0̅245̅	0̅470	0̅696	0̅922	1̅148	1̅373	1̅599	1̅825̅
24	284 2051	2276	2502	2728	2953	3179	3405̅	3630	3856	4082
25	4307	4533	4759	4984	5210	5435	5661	5886	6112	6337
26	6563	6788	7014	7239	7465̅	7690	7916	8141	8366	8592
27	8817	9043	9268	9493	9719	9944	0̅169	0̅394	0̅620	0̅845
28	285 1070	1296	1521	1746	1971	2196	2422	2647	2872	3097
29	3322	3547	3773	3998	4223	4448	4673	4898	5123	5348
1930	5573	5798	6023	6248	6473	6698	6923	7148	7373	7598
31	7823	8048	8273	8497	8722	8947	9172	9397	9622	9846
32	286 0071	0296	0521	0746	0970	1195	1420	1644	1869	2094
33	2319	2543	2768	2993	3217	3442	3666	3891	4116	4340
34	4565̅	4789	5014	5238	5463	5687	5912	6136	6361	6585
35	6810	7034	7259	7483	7707	7932	8156	8381	8605̅	8829
36	9054	9278	9502	9726	9951	0̅175	0̅399	0̅624	0̅848	1̅072
37	287 1296	1520	1745̅	1969	2193	2417	2641	2865	3090	3314
38	3538	3762	3986	4210	4434	4658	4882	5106	5330	5554
39	5778	6002	6226	6450	6674	6898	7122	7346	7570	7793
1940	8017	8241	8465	8689	8913	9136	9360	9584	9808	0̅032
41	288 0255	0479	0703	0927	1150	1374	1598	1821	2045̅	2269
42	2492	2716	2939	3163	3387	3610	3834	4057	4281	4504
43	4728	4952	5175	5399	5622	5845	6069	6292	6516	6739
44	6963	7186	7409	7633	7856	8079	8303	8526	8749	8973
45	9196	9419	9643	9866	0̅089	0̅312	0̅536	0̅759	0̅982	1̅205
46	289 1428	1652	1875̅	2098	2321	2544	2767	2990	3213	3436
47	3660	3883	4106	4329	4552	4775̅	4998	5221	5444	5667
48	5890	6112	6335	6558	6781	7004	7227	7450	7673	7896
49	8118	8341	8564	8787	9010	9232	9455	9678	9901	0̅123
1950	290 0346	0569	0792	1014	1237	1460	1682	1905̅	2127	2350
N.	0	1	2	3	4	5	6	7	8	9

P. P.

	229	228
1	22.9	22.8
2	45.8	45.6
3	68.7	68.4
4	91.6	91.2
5	114.5	114.0
6	137.4	136.8
7	160.3	159.6
8	183.2	182.4
9	206.1	205.2

	227	226
1	22.7	22.6
2	45.4	45.2
3	68.1	67.8
4	90.8	90.4
5	113.5	113.0
6	136.2	135.6
7	158.9	158.2
8	181.6	180.8
9	204.3	203.4

	225	224
1	22.5	22.4
2	45.0	44.8
3	67.5	67.2
4	90.0	89.6
5	112.5	112.0
6	135.0	134.4
7	157.5	156.8
8	180.0	179.2
9	202.5	201.6

	223
1	22.3
2	44.6
3	66.9
4	89.2
5	111.5
6	133.8
7	156.1
8	178.4
9	200.7

P. P.

N.	0	1	2	3	4	5	6	7	8	9
1950	290 0346	0569	0792	1014	1237	1460	1682	1905̄	2127	2350
51	2573	2795	3018	3240	3463	3686	3908	4131	4353	4576
52	4798	5021	5243	5466	5688	5910	6133	6355	6578	6800
53	7022	7245̄	7467	7690	7912	8134	8356	8579	8801	9023
54	9246	9468	9690	9912	0̄135̄	0̄357	0̄579	0̄801	1̄023	1̄245
55	291 1468	1690	1912	2134	2356	2578	2800	3022	3244	3466
56	3689	3911	4133	4355̄	4577	4799	5020	5242	5464	5686
57	5908	6130	6352	6574	6796	7018	7240	7461	7683	7905
58	8127	8349	8570	8792	9014	9236	9458	9679	9901	0̄123
59	292 0344	0566	0788	1009	1231	1453	1674	1896	2118	2339
1960	2561	2782	3004	3225	3447	3668	3890	4111	4333	4554
61	4776	4997	5219	5440	5662	5883	6105̄	6326	6547	6769
62	6990	7211	7433	7654	7875	8097	8318	8539	8760	8982
63	9203	9424	9645	9867	0̄088	0̄309	0̄530	0̄751	0̄973	1̄194
64	293 1415̄	1636	1857	2078	2299	2520	2741	2962	3183	3405̄
65	3626	3847	4068	4289	4510	4730	4951	5172	5393	5614
66	5835	6056	6277	6498	6719	6940	7160	7381	7602	7823
67	8044	8264	8485	8706	8927	9147	9368	9589	9810	0̄030
68	294 0251	0472	0692	0913	1134	1354	1575̄	1795	2016	2237
69	2457	2678	2898	3119	3339	3560	3780	4001	4221	4442
1970	4662	4883	5103	5324	5544	5764	5985̄	6205	6426	6646
71	6866	7087	7307	7527	7748	7968	8188	8408	8629	8849
72	9069	9289	9510	9730	9950	0̄170	0̄390	0̄610	0̄831	1̄051
73	295 1271	1491	1711	1931	2151	2371	2591	2811	3031	3251
74	3471	3691	3911	4131	4351	4571	4791	5011	5231	5451
75	5671	5891	6111	6331	6550	6770	6990	7210	7430	7650
76	7869	8089	8309	8529	8748	8968	9188	9408	9627	9847
77	296 0067	0286	0506	0726	0945	1165̄	1385̄	1604	1824	2043
78	2263	2482	2702	2922	3141	3361	3580	3800	4019	4238
79	4458	4677	4897	5116	5336	5555	5774	5994	6213	6433
1980	6652	6871	7091	7310	7529	7748	7968	8187	8406	8626
81	8845̄	9064	9283	9502	9722	9941	0̄160	0̄379	0̄598	0̄817
82	297 1037	1256	1475̄	1694	1913	2132	2351	2570	2789	3008
83	3227	3446	3665	3884	4103	4322	4541	4760	4979	5198
84	5417	5636	5854	6073	6292	6511	6730	6949	7168	7386
85	7605	7824	8043	8261	8480	8699	8918	9136	9355	9574
86	9792	0̄011	0̄230	0̄448	0̄667	0̄886	1̄104	1̄323	1̄542	1̄760
87	298 1979	2197	2416	2634	2853	3071	3290	3508	3727	3945
88	4164	4382	4601	4819	5038	5256	5474	5693	5911	6129
89	6348	6566	6785̄	7003	7221	7439	7658	7876	8094	8313
1990	8531	8749	8967	9185	9404	9622	9840	0̄058	0̄276	0̄494
91	299 0713	0931	1149	1367	1585	1803	2021	2239	2457	2675
92	2893	3111	3329	3547	3765	3983	4201	4419	4637	4855
93	5073	5291	5509	5727	5945̄	6162	6380	6598	6816	7034
94	7252	7469	7687	7905̄	8123	8340	8558	8776	8994	9211
95	9429	9647	9864	0̄082	0̄300	0̄517	0̄735̄	0̄953	1̄170	1̄388
96	300 1605	1823	2041	2258	2476	2693	2911	3128	3346	3563
97	3781	3998	4216	4433	4650	4868	5085	5303	5520	5737
98	5955̄	6172	6390	6607	6824	7042	7259	7476	7693	7911
99	8128	8345	8562	8780	8997	9214	9431	9648	9866	0̄083
2000	301 0300	0517	0734	0951	1168	1386	1603	1820	2037	2254
N.	0	1	2	3	4	5	6	7	8	9

P. P.

	223	222
1	22.3	22.2
2	44.6	44.4
3	66.9	66.6
4	89.2	88.8
5	111.5	111.0
6	133.8	133.2
7	156.1	155.4
8	178.4	177.6
9	200.7	199.8

	221	220
1	22.1	22.0
2	44.2	44.0
3	66.3	66.0
4	88.4	88.0
5	110.5	110.0
6	132.6	132.0
7	154.7	154.0
8	176.8	176.0
9	198.9	198.0

	219	218
1	21.9	21.8
2	43.8	43.6
3	65.7	65.4
4	87.6	87.2
5	109.5	109.0
6	131.4	130.8
7	153.3	152.6
8	175.2	174.4
9	197.1	196.2

	217
1	21.7
2	43.4
3	65.1
4	86.8
5	108.5
6	130.2
7	151.9
8	173.6
9	195.3

P. P.

N.	0	1	2	3	4	5	6	7	8	9
2000	301 0300	0517	0734	0951	1168	1386	1603	1820	2037	2254
01	2471	2688	2905̄	3122	3339	3556	3773	3990	4207	4424
02	4641	4858	5075̄	5291	5508	5725	5942	6159	6376	6593
03	6809	7026	7243	7460	7677	7893	8110	8327	8544	8760
04	8977	9194	9411	9627	9844	0̄061	0̄277	0̄494	0̄711	0̄927
05	302 1144	1360	1577	1794	2010	2227	2443	2660	2876	3093
06	3309	3526	3742	3959	4175	4392	4608	4825̄	5041	5257
07	5474	5690	5906	6123	6339	6556	6772	6988	7204	7421
08	7637	7853	8070	8286	8502	8718	8935̄	9151	9367	9583
09	9799	0̄016	0̄232	0̄448	0̄664	0̄880	1̄096	1̄312	1̄528	1̄745̄
2010	303 1961	2177	2393	2609	2825̄	3041	3257	3473	3689	3905̄
11	4121	4337	4553	4769	4984	5200	5416	5632	5848	6064
12	6280	6496	6711	6927	7143	7359	7575̄	7790	8006	8222
13	8438	8653	8869	9085̄	9301	9516	9732	9948	0̄163	0̄379
14	304 0595̄	0810	1026	1242	1457	1673	1888	2104	2319	2535̄
15	2751	2966	3182	3397	3613	3828	4043	4259	4474	4690
16	4905	5121	5336	5552	5767	5982	6198	6413	6628	6844
17	7059	7274	7490	7705̄	7920	8135	8351	8566	8781	8996
18	9212	9427	9642	9857	0̄072	0̄288	0̄503	0̄718	0̄933	1̄148
19	305 1363	1578	1793	2008	2224	2439	2654	2869	3084	3299
2020	3514	3729	3944	4159	4374	4589	4803	5018	5233	5448
21	5663	5878	6093	6308	6523	6737	6952	7167	7382	7597
22	7812	8026	8241	8456	8671	8885	9100	9315̄	9529	9744
23	9959	0̄174	0̄388	0̄603	0̄817	1̄032	1̄247	1̄461	1̄676	1̄891
24	306 2105	2320	2534	2749	2963	3178	3392	3607	3821	4036
25	4250	4465̄	4679	4894	5108	5322	5537	5751	5966	6180
26	6394	6609	6823	7037	7252	7466	7680	7895̄	8109	8323
27	8537	8752	8966	9180	9394	9609	9823	0̄037	0̄251	0̄465
28	307 0680	0894	1108	1322	1536	1750	1964	2178	2392	2606
29	2820	3035̄	3249	3463	3677	3891	4105̄	4319	4532	4746
2030	4960	5174	5388	5602	5816	6030	6244	6458	6672	6885
31	7099	7313	7527	7741	7954	8168	8382	8596	8810	9023
32	9237	9451	9664	9878	0̄092	0̄306	0̄519	0̄733	0̄947	1̄160
33	308 1374	1587	1801	2015̄	2228	2442	2655	2869	3082	3296
34	3509	3723	3936	4150	4363	4577	4790	5004	5217	5431
35	5644	5858	6071	6284	6498	6711	6924	7138	7351	7564
36	7778	7991	8204	8418	8631	8844	9057	9271	9484	9697
37	9910	0̄123	0̄337	0̄550	0̄763	0̄976	1̄189	1̄402	1̄616	1̄829
38	309 2042	2255̄	2468	2681	2894	3107	3320	3533	3746	3959
39	4172	4385	4598	4811	5024	5237	5450	5663	5876	6089
2040	6302	6515̄	6727	6940	7153	7366	7579	7792	8004	8217
41	8430	8643	8856	9068	9281	9494	9707	9919	0̄132	0̄345̄
42	310 0557	0770	0983	1195	1408	1621	1833	2046	2258	2471
43	2684	2896	3109	3321	3534	3746	3959	4171	4384	4596
44	4809	5021	5234	5446	5659	5871	6084	6296	6508	6721
45	6933	7145	7358	7570	7783	7995̄	8207	8419	8632	8844
46	9056	9269	9481	9693	9905	0̄117	0̄330	0̄542	0̄754	0̄966
47	311 1178	1391	1603	1815̄	2027	2239	2451	2663	2875	3087
48	3300	3512	3724	3936	4148	4360	4572	4784	4996	5208
49	5420	5632	5843	6055	6267	6479	6691	6903	7115̄	7327
2050	7539	7750	7962	8174	8386	8598	8810	9021	9233	9445̄
N.	0	1	2	3	4	5	6	7	8	9

P. P.

	218	217
1	21.8	21.7
2	43.6	43.4
3	65.4	65.1
4	87.2	86.8
5	109.0	108.5
6	130.8	130.2
7	152.6	151.9
8	174.4	173.6
9	196.2	195.3

	216	215
1	21.6	21.5
2	43.2	43.0
3	64.8	64.5
4	86.4	86.0
5	108.0	107.5
6	129.6	129.0
7	151.2	150.5
8	172.8	172.0
9	194.4	193.5

	214	213
1	21.4	21.3
2	42.8	42.6
3	64.2	63.9
4	85.6	85.2
5	107.0	106.5
6	128.4	127.8
7	149.8	149.1
8	171.2	170.4
9	192.6	191.7

	212
1	21.2
2	42.4
3	63.6
4	84.8
5	106.0
6	127.2
7	148.4
8	169.6
9	190.8

P. P.

N.	0	1	2	3	4	5	6	7	8	9	P. P.
2050	311 7539	7750	7962	8174	8386	8598	8810	9021	9233	9445̄	
51	9657	9868	0̄080	0̄292	0̄504	0̄715	0̄927	1̄139	1̄350	1̄562	
52	312 1774	1985	2197	2408	2620	2832	3043	3255̄	3466	3678	
53	3889	4101	4313	4524	4736	4947	5159	5370	5581	5793	
54	6004	6216	6427	6639	6850	7061	7273	7484	7696	7907	
55	8118	8330	8541	8752	8964	9175̄	9386	9597	9809	0̄020	
56	313 0231	0442	0654	0865̄	1076	1287	1498	1709	1921	2132	
57	2343	2554	2765	2976	3187	3398	3610	3821	4032	4243	
58	4454	4665̄	4876	5087	5298	5509	5720	5931	6142	6353	
59	6563	6774	6985	7196	7407	7618	7829	8040	8251	8461	
2060	8672	8883	9094	9305̄	9515	9726	9937	0̄148	0̄358	0̄569	
61	314 0780	0991	1201	1412	1623	1833	2044	2255̄	2465	2676	
62	2887	3097	3308	3518	3729	3940	4150	4361	4571	4782	
63	4992	5203	5413	5624	5834	6045̄	6255	6466	6676	6887	
64	7097	7307	7518	7728	7939	8149	8359	8570	8780	8990	
65	9201	9411	9621	9831	0̄042	0̄252	0̄462	0̄672	0̄883	1̄093	
66	315 1303	1513	1724	1934	2144	2354	2564	2774	2985̄	3195̄	
67	3405̄	3615̄	3825̄	4035	4245	4455	4665	4875	5085	5295	
68	5505	5715	5925	6135	6345	6555	6765	6975	7185	7395̄	
69	7605̄	7815̄	8025̄	8235̄	8444	8654	8864	9074	9284	9494	
2070	9703	9913	0̄123	0̄333	0̄543	0̄752	0̄962	1̄172	1̄382	1̄591	
71	316 1801	2011	2220	2430	2640	2849	3059	3269	3478	3688	
72	3898	4107	4317	4526	4736	4945	5155̄	5364	5574	5784	
73	5993	6203	6412	6621	6831	7040	7250	7459	7669	7878	
74	8088	8297	8506	8716	8925	9134	9344	9553	9762	9972	
75	317 0181	0390	0600	0809	1018	1227	1437	1646	1855	2064	
76	2273	2483	2692	2901	3110	3319	3528	3738	3947	4156	
77	4365̄	4574	4783	4992	5201	5410	5619	5828	6037	6246	
78	6455	6664	6873	7082	7291	7500	7709	7918	8127	8336	
79	8545̄	8754	8963	9172	9380	9589	9798	0̄007	0̄216	0̄425̄	
2080	318 0633	0842	1051	1260	1468	1677	1886	2095̄	2303	2512	
81	2721	2929	3138	3347	3556	3764	3973	4181	4390	4599	
82	4807	5016	5224	5433	5642	5850	6059	6267	6476	6684	
83	6893	7101	7310	7518	7727	7935	8143	8352	8560	8769	
84	8977	9186	9394	9602	9811	0̄019	0̄227	0̄436	0̄644	0̄852	
85	319 1061	1269	1477	1685	1894	2102	2310	2518	2727	2935̄	
86	3143	3351	3559	3768	3976	4184	4392	4600	4808	5016	
87	5224	5433	5641	5849	6057	6265̄	6473	6681	6889	7097	
88	7305̄	7513	7721	7929	8137	8345̄	8553	8761	8969	9176	
89	9384	9592	9800	0̄008	0̄216	0̄424	0̄632	0̄839	1̄047	1̄255	
2090	320 1463	1671	1878	2086	2294	2502	2709	2917	3125̄	3333	
91	3540	3748	3956	4163	4371	4579	4786	4994	5202	5409	
92	5617	5824	6032	6240	6447	6655̄	6862	7070	7277	7485̄	
93	7692	7900	8107	8315̄	8522	8730	8937	9145̄	9352	9559	
94	9767	9974	0̄182	0̄389	0̄596	0̄804	1̄011	1̄218	1̄426	1̄633	
95	321 1840	2048	2255̄	2462	2669	2877	3084	3291	3498	3706	
96	3913	4120	4327	4534	4742	4949	5156	5363	5570	5777	
97	5984	6191	6398	6606	6813	7020	7227	7434	7641	7848	
98	8055̄	8262	8469	8676	8883	9090	9297	9504	9711	9917	
99	322 0124	0331	0538	0745	0952	1159	1366	1572	1779	1986	
2100	2193	2400	2607	2813	3020	3227	3434	3640	3847	4054	
N.	0	1	2	3	4	5	6	7	8	9	P. P.

	212	211
1	21.2	21.1
2	42.4	42.2
3	63.6	63.3
4	84.8	84.4
5	106.0	105.5
6	127.2	126.6
7	148.4	147.7
8	169.6	168.8
9	190.8	189.9

	210	209
1	21.0	20.9
2	42.0	41.8
3	63.0	62.7
4	84.0	83.6
5	105.0	104.5
6	126.0	125.4
7	147.0	146.3
8	168.0	167.2
9	189.0	188.1

	208	207
1	20.8	20.7
2	41.6	41.4
3	62.4	62.1
4	83.2	82.8
5	104.0	103.5
6	124.8	124.2
7	145.6	144.9
8	166.4	165.6
9	187.2	186.3

	206
1	20.6
2	41.2
3	61.8
4	82.4
5	103.0
6	123.6
7	144.2
8	164.8
9	185.4

2100 — 2150

N.	0	1	2	3	4	5	6	7	8	9
2100	322 2193	2400	2607	2813	3020	3227	3434	3640	3847	4054
01	4261	4467	4674	4881	5087	5294	5501	5707	5914	6121
02	6327	6534	6740	6947	7153	7360	7567	7773	7980	8186
03	8393	8599	8806	9012	9219	9425	9632	9838	0̄045̄	0̄251
04	323 0457	0664	0870	1077	1283	1489	1696	1902	2108	2315̄
05	2521	2727	2934	3140	3346	3552	3759	3965̄	4171	4377
06	4584	4790	4996	5202	5408	5615̄	5821	6027	6233	6439
07	6645	6851	7058	7264	7470	7676	7882	8088	8294	8500
08	8706	8912	9118	9324	9530	9736	9942	0̄148	0̄354	0̄560
09	324 0766	0972	1178	1384	1589	1795	2001	2207	2413	2619
2110	2825̄	3030	3236	3442	3648	3854	4059	4265	4471	4677
11	4882	5088	5294	5499	5705	5911	6117	6322	6528	6734
12	6939	7145̄	7350	7556	7762	7967	8173	8378	8584	8789
13	8995̄	9201	9406	9612	9817	0̄023	0̄228	0̄433	0̄639	0̄844
14	325 1050	1255	1461	1666	1872	2077	2282	2488	2693	2898
15	3104	3309	3514	3720	3925	4130	4336	4541	4746	4951
16	5157	5362	5567	5772	5978	6183	6388	6593	6798	7003
17	7209	7414	7619	7824	8029	8234	8439	8644	8849	9055̄
18	9260	9465̄	9670	9875̄	0̄080	0̄285̄	0̄490	0̄695̄	0̄900	1̄105̄
19	326 1310	1515̄	1719	1924	2129	2334	2539	2744	2949	3154
2120	3359	3563	3768	3973	4178	4383	4588	4792	4997	5202
21	5407	5611	5816	6021	6226	6430	6635	6840	7044	7249
22	7454	7658	7863	8068	8272	8477	8682	8886	9091	9295
23	9500	9705̄	9909	0̄114	0̄318	0̄523	0̄727	0̄932	1̄136	1̄341
24	327 1545	1750	1954	2158	2363	2567	2772	2976	3181	3385̄
25	3589	3794	3998	4202	4407	4611	4815	5020	5224	5428
26	5633	5837	6041	6245	6450	6654	6858	7062	7267	7471
27	7675̄	7879	8083	8287	8492	8696	8900	9104	9308	9512
28	9716	9920	0̄124	0̄328	0̄533	0̄737	0̄941	1̄145̄	1̄349	1̄553
29	328 1757	1961	2165̄	2369	2572	2776	2980	3184	3388	3592
2130	3796	4000	4204	4408	4612	4815	5019	5223	5427	5631
31	5834	6038	6242	6446	6650	6853	7057	7261	7465̄	7668
32	7872	8076	8279	8483	8687	8890	9094	9298	9501	9705̄
33	9909	0̄112	0̄316	0̄519	0̄723	0̄926	1̄130	1̄334	1̄537	1̄741
34	329 1944	2148	2351	2555̄	2758	2962	3165	3369	3572	3775
35	3979	4182	4386	4589	4792	4996	5199	5402	5606	5809
36	6012	6216	6419	6622	6826	7029	7232	7436	7639	7842
37	8045	8248	8452	8655̄	8858	9061	9264	9468	9671	9874
38	330 0077	0280	0483	0686	0889	1093	1296	1499	1702	1905̄
39	2108	2311	2514	2717	2920	3123	3326	3529	3732	3935̄
2140	4138	4341	4544	4747	4949	5152	5355	5558	5761	5964
41	6167	6370	6572	6775	6978	7181	7384	7586	7789	7992
42	8195̄	8397	8600	8803	9006	9208	9411	9614	9816	0̄019
43	331 0222	0424	0627	0830	1032	1235̄	1437	1640	1843	2045
44	2248	2450	2653	2855	3058	3261	3463	3666	3868	4070
45	4273	4475	4678	4880	5083	5285	5488	5690	5892	6095̄
46	6297	6500	6702	6904	7107	7309	7511	7714	7916	8118
47	8320	8523	8725̄	8927	9129	9332	9534	9736	9938	0̄141
48	332 0343	0545̄	0747	0949	1151	1354	1556	1758	1960	2162
49	2364	2566	2768	2970	3172	3374	3577	3779	3981	4183
2150	4385̄	4587	4789	4991	5193	5394	5596	5798	6000	6202
N.	0	1	2	3	4	5	6	7	8	9

P. P.

	207	206
1	20.7	20.6
2	41.4	41.2
3	62.1	61.8
4	82.8	82.4
5	103.5	103.0
6	124.2	123.6
7	144.9	144.2
8	165.6	164.8
9	186.3	185.4

	205	204
1	20.5	20.4
2	41.0	40.8
3	61.5	61.2
4	82.0	81.6
5	102.5	102.0
6	123.0	122.4
7	143.5	142.8
8	164.0	163.2
9	184.5	183.6

	203	202
1	20.3	20.2
2	40.6	40.4
3	60.9	60.6
4	81.2	80.8
5	101.5	101.0
6	121.8	121.2
7	142.1	141.4
8	162.4	161.6
9	182.7	181.8

P. P.

N.	0	1	2	3	4	5	6	7	8	9	P. P.
2150	332 4385̄	4587	4789	4991	5193	5394	5596	5798	6000	6202	
51	6404	6606	6808	7010	7212	7414	7615	7817	8019	8221	
52	8423	8624	8826	9028	9230	9432	9633	9835	0̄037	0̄239	
53	333 0440	0642	0844	1045	1247	1449	1650	1852	2054	2255	
54	2457	2659	2860	3062	3263	3465̄	3667	3868	4070	4271	
55	4473	4674	4876	5077	5279	5480	5682	5883	6085̄	6286	
56	6488	6689	6890	7092	7293	7495̄	7696	7897	8099	8300	
57	8501	8703	8904	9105	9307	9508	9709	9911	0̄112	0̄313	
58	334 0514	0716	0917	1118	1319	1521	1722	1923	2124	2325	
59	2526	2728	2929	3130	3331	3532	3733	3934	4135	4336	
2160	4538	4739	4940	5141	5342	5543	5744	5945̄	6146	6347	
61	6548	6749	6950	7151	7351	7552	7753	7954	8155	8356	
62	8557	8758	8959	9159	9360	9561	9762	9963	0̄164	0̄364	
63	335 0565	0766	0967	1168	1368	1569	1770	1970	2171	2372	
64	2573	2773	2974	3175̄	3375	3576	3777	3977	4178	4378	
65	4579	4780	4980	5181	5381	5582	5782	5983	6183	6384	
66	6585̄	6785	6986	7186	7386	7587	7787	7988	8188	8389	
67	8589	8790	8990	9190	9391	9591	9791	9992	0̄192	0̄392	
68	336 0593	0793	0993	1194	1394	1594	1795̄	1995̄	2195	2395	
69	2596	2796	2996	3196	3396	3597	3797	3997	4197	4397	
2170	4597	4797	4998	5198	5398	5598	5798	5998	6198	6398	
71	6598	6798	6998	7198	7398	7598	7798	7998	8198	8398	
72	8598	8798	8998	9198	9398	9598	9798	9998	0̄198	0̄397	
73	337 0597	0797	0997	1197	1397	1596	1796	1996	2196	2396	
74	2595	2795	2995̄	3195̄	3394	3594	3794	3994	4193	4393	
75	4593	4792	4992	5192	5391	5591	5791	5990	6190	6389	
76	6589	6788	6988	7188	7387	7587	7786	7986	8185	8385̄	
77	8584	8784	8983	9183	9382	9582	9781	9981	0̄180	0̄379	
78	338 0579	0778	0978	1177	1376	1576	1775̄	1974	2174	2373	
79	2572	2772	2971	3170	3369	3569	3768	3967	4166	4366	
2180	4565̄	4764	4963	5163	5362	5561	5760	5959	6158	6358	
81	6557	6756	6955̄	7154	7353	7552	7751	7950	8149	8348	
82	8547	8746	8946	9145̄	9344	9543	9742	9940	0̄139	0̄338	
83	339 0537	0736	0935	1134	1333	1532	1731	1930	2129	2327	
84	2526	2725	2924	3123	3322	3520	3719	3918	4117	4316	
85	4514	4713	4912	5111	5309	5508	5707	5906	6104	6303	
86	6502	6700	6899	7098	7296	7495̄	7693	7892	8091	8289	
87	8488	8686	8885̄	9084	9282	9481	9679	9878	0̄076	0̄275̄	
88	340 0473	0672	0870	1069	1267	1466	1664	1862	2061	2259	
89	2458	2656	2854	3053	3251	3449	3648	3846	4045̄	4243	
2190	4441	4639	4838	5036	5234	5433	5631	5829	6027	6226	
91	6424	6622	6820	7018	7217	7415̄	7613	7811	8009	8207	
92	8405	8604	8802	9000	9198	9396	9594	9792	9990	0̄188	
93	341 0386	0584	0782	0980	1178	1376	1574	1772	1970	2168	
94	2366	2564	2762	2960	3158	3356	3554	3752	3950	4147	
95	4345	4543	4741	4939	5137	5334	5532	5730	5928	6126	
96	6323	6521	6719	6917	7114	7312	7510	7708	7905	8103	
97	8301	8498	8696	8894	9091	9289	9486	9684	9882	0̄079	
98	342 0277	0474	0672	0870	1067	1265̄	1462	1660	1857	2055̄	
99	2252	2450	2647	2845̄	3042	3240	3437	3635̄	3832	4029	
2200	4227	4424	4622	4819	5016	5214	5411	5608	5806	6003	
N.	0	1	2	3	4	5	6	7	8	9	P. P.

	202	201
1	20.2	20.1
2	40.4	40.2
3	60.6	60.3
4	80.8	80.4
5	101.0	100.5
6	121.2	120.6
7	141.4	140.7
8	161.6	160.8
9	181.8	180.9

	200	199
1	20.0	19.9
2	40.0	39.8
3	60.0	59.7
4	80.0	79.6
5	100.0	99.5
6	120.0	119.4
7	140.0	139.3
8	160.0	159.2
9	180.0	179.1

	198	197
1	19.8	19.7
2	39.6	39.4
3	59.4	59.1
4	79.2	78.8
5	99.0	98.5
6	118.8	118.2
7	138.6	137.9
8	158.4	157.6
9	178.2	177.3

2200 — 2250

N.	0	1	2	3	4	5	6	7	8	9
2200	342 4227	4424	4622	4819	5016	5214	5411	5608	5806	6003
01	6200	6398	6595	6792	6990	7187	7384	7581	7779	7976
02	8173	8370	8568	8765̄	8962	9159	9356	9554	9751	9948
03	343 0145̄	0342	0539	0736	0933	1131	1328	1525̄	1722	1919
04	2116	2313	2510	2707	2904	3101	3298	3495	3692	3889
05	4086	4283	4480	4677	4874	5071	5268	5464	5661	5858
06	6055	6252	6449	6646	6842	7039	7236	7433	7630	7827
07	8023	8220	8417	8614	8810	9007	9204	9401	9597	9794
08	9991	0̄187	0̄384	0̄581	0̄777	0̄974	1̄171	1̄367	1̄564	1̄761
09	344 1957	2154	2350	2547	2743	2940	3137	3333	3530	3726
2210	3923	4119	4316	4512	4709	4905	5102	5298	5495̄	5691
11	5887	6084	6280	6477	6673	6869	7066	7262	7459	7655̄
12	7851	8048	8244	8440	8636	8833	9029	9225	9422	9618
13	9814	0̄010	0̄207	0̄403	0̄599	0̄795	0̄991	1̄188	1̄384	1̄580
14	345 1776	1972	2168	2365̄	2561	2757	2953	3149	3345	3541
15	3737	3933	4129	4325	4522	4718	4914	5110	5306	5502
16	5698	5894	6090	6285	6481	6677	6873	7069	7265	7461
17	7657	7853	8049	8245̄	8440	8636	8832	9028	9224	9420
18	9615	9811	0̄007	0̄203	0̄399	0̄594	0̄790	0̄986	1̄182	1̄377
19	346 1573	1769	1964	2160	2356	2551	2747	2943	3138	3334
2220	3530	3725	3921	4117	4312	4508	4703	4899	5094	5290
21	5486	5681	5877	6072	6268	6463	6659	6854	7050	7245
22	7441	7636	7831	8027	8222	8418	8613	8808	9004	9199
23	9395̄	9590	9785	9981	0̄176	0̄371	0̄567	0̄762	0̄957	1̄153
24	347 1348	1543	1738	1934	2129	2324	2519	2715̄	2910	3105̄
25	3300	3495	3691	3886	4081	4276	4471	4666	4861	5056
26	5252	5447	5642	5837	6032	6227	6422	6617	6812	7007
27	7202	7397	7592	7787	7982	8177	8372	8567	8762	8957
28	9152	9347	9542	9737	9931	0̄126	0̄321	0̄516	0̄711	0̄906
29	348 1101	1296	1490	1685	1880	2075̄	2270	2464	2659	2854
2230	3049	3243	3438	3633	3828	4022	4217	4412	4606	4801
31	4996	5190	5385	5580	5774	5969	6164	6358	6553	6747
32	6942	7136	7331	7526	7720	7915̄	8109	8304	8498	8693
33	8887	9082	9276	9471	9665	9860	0̄054	0̄248	0̄443	0̄637
34	349 0832	1026	1220	1415̄	1609	1804	1998	2192	2387	2581
35	2775	2970	3164	3358	3552	3747	3941	4135	4330	4524
36	4718	4912	5106	5301	5495̄	5689	5883	6077	6272	6466
37	6660	6854	7048	7242	7436	7630	7825̄	8019	8213	8407
38	8601	8795̄	8989	9183	9377	9571	9765̄	9959	0̄153	0̄347
39	350 0541	0735̄	0929	1123	1317	1511	1705̄	1898	2092	2286
2240	2480	2674	2868	3062	3256	3449	3643	3837	4031	4225̄
41	4419	4612	4806	5000	5194	5387	5581	5775̄	5969	6162
42	6356	6550	6743	6937	7131	7325̄	7518	7712	7905	8099
43	8293	8486	8680	8874	9067	9261	9454	9648	9841	0̄035̄
44	351 0229	0422	0616	0809	1003	1196	1390	1583	1777	1970
45	2163	2357	2550	2744	2937	3131	3324	3517	3711	3904
46	4098	4291	4484	4678	4871	5064	5258	5451	5644	5837
47	6031	6224	6417	6611	6804	6997	7190	7383	7577	7770
48	7963	8156	8349	8543	8736	8929	9122	9315	9508	9701
49	9895̄	0̄088	0̄281	0̄474	0̄667	0̄860	1̄053	1̄246	1̄439	1̄632
2250	352 1825	2018	2211	2404	2597	2790	2983	3176	3369	3562
N.	0	1	2	3	4	5	6	7	8	9

P. P.

	198	197
1	19.8	19.7
2	39.6	39.4
3	59.4	59.1
4	79.2	78.8
5	99.0	98.5
6	118.8	118.2
7	138.6	137.9
8	158.4	157.6
9	178.2	177.3

	196	195
1	19.6	19.5
2	39.2	39.0
3	58.8	58.5
4	78.4	78.0
5	98.0	97.5
6	117.6	117.0
7	137.2	136.5
8	156.8	156.0
9	176.4	175.5

	194	193
1	19.4	19.3
2	38.8	38.6
3	58.2	57.9
4	77.6	77.2
5	97.0	96.5
6	116.4	115.8
7	135.8	135.1
8	155.2	154.4
9	174.6	173.7

P. P.

N.	0	1	2	3	4	5	6	7	8	9	P. P.
2250	352 1825	2018	2211	2404	2597	2790	2983	3176	3369	3562	
51	3755̄	3948	4141	4334	4527	4720	4912	5105	5298	5491	
52	5684	5877	6070	6262	6455	6648	6841	7034	7226	7419	
53	7612	7805̄	7997	8190	8383	8576	8768	8961	9154	9346	
54	9539	9732	9924	0̄117	0̄310	0̄502	0̄695	0̄888	1̄080	1̄273	
55	353 1465	1658	1851	2043	2236	2428	2621	2813	3006	3198	
56	3391	3583	3776	3968	4161	4353	4546	4738	4931	5123	
57	5316	5508	5700	5893	6085	6278	6470	6662	6855̄	7047	
58	7239	7432	7624	7816	8009	8201	8393	8586	8778	8970	
59	9162	9355̄	9547	9739	9931	0̄123	0̄316	0̄508	0̄700	0̄892	
2260	354 1084	1277	1469	1661	1853	2045	2237	2429	2621	2814	
61	3006	3198	3390	3582	3774	3966	4158	4350	4542	4734	
62	4926	5118	5310	5502	5694	5886	6078	6270	6462	6654	
63	6846	7037	7229	7421	7613	7805̄	7997	8189	8381	8572	
64	8764	8956	9148	9340	9531	9723	9915	0̄107	0̄299	0̄490	
65	355 0682	0874	1066	1257	1449	1641	1832	2024	2216	2407	
66	2599	2791	2982	3174	3366	3557	3749	3940	4132	4324	
67	4515	4707	4898	5090	5281	5473	5664	5856	6048	6239	
68	6431	6622	6813	7005̄	7196	7388	7579	7771	7962	8154	
69	8345̄	8536	8728	8919	9111	9302	9493	9685̄	9876	0̄067	
2270	356 0259	0450	0641	0832	1024	1215	1406	1598	1789	1980	
71	2171	2363	2554	2745	2936	3127	3319	3510	3701	3892	
72	4083	4274	4466	4657	4848	5039	5230	5421	5612	5803	
73	5994	6185	6376	6568	6759	6950	7141	7332	7523	7714	
74	7905̄	8096	8287	8478	8668	8859	9050	9241	9432	9623	
75	9814	0̄005̄	0̄196	0̄387	0̄578	0̄768	0̄959	1̄150	1̄341	1̄532	
76	357 1723	1913	2104	2295̄	2486	2677	2867	3058	3249	3440	
77	3630	3821	4012	4202	4393	4584	4775̄	4965	5156	5347	
78	5537	5728	5918	6109	6300	6490	6681	6872	7062	7253	
79	7443	7634	7824	8015̄	8205	8396	8586	8777	8967	9158	
2280	9348	9539	9729	9920	0̄110	0̄301	0̄491	0̄682	0̄872	1̄062	
81	358 1253	1443	1634	1824	2014	2205̄	2395	2585	2776	2966	
82	3156	3347	3537	3727	3918	4108	4298	4488	4679	4869	
83	5059	5249	5440	5630	5820	6010	6200	6391	6581	6771	
84	6961	7151	7341	7531	7722	7912	8102	8292	8482	8672	
85	8862	9052	9242	9432	9622	9812	0̄002	0̄192	0̄382	0̄572	
86	359 0762	0952	1142	1332	1522	1712	1902	2092	2282	2472	
87	2662	2852	3041	3231	3421	3611	3801	3991	4181	4370	
88	4560	4750	4940	5130	5319	5509	5699	5889	6078	6268	
89	6458	6648	6837	7027	7217	7406	7596	7786	7976	8165	
2290	8355̄	8544	8734	8924	9113	9303	9493	9682	9872	0̄061	
91	360 0251	0440	0630	0820	1009	1199	1388	1578	1767	1957	
92	2146	2336	2525	2715̄	2904	3093	3283	3472	3662	3851	
93	4041	4230	4419	4609	4798	4987	5177	5366	5555	5745̄	
94	5934	6123	6313	6502	6691	6881	7070	7259	7448	7638	
95	7827	8016	8205	8395̄	8584	8773	8962	9151	9341	9530	
96	9719	9908	0̄097	0̄286	0̄475	0̄664	0̄854	1̄043	1̄232	1̄421	
97	361 1610	1799	1988	2177	2366	2555	2744	2933	3122	3311	
98	3500	3689	3878	4067	4256	4445	4634	4823	5012	5201	
99	5390	5579	5768	5956	6145	6334	6523	6712	6901	7090	
2300	7278	7467	7656	7845̄	8034	8222	8411	8600	8789	8977	
N.	0	1	2	3	4	5	6	7	8	9	P. P.

	193	192
1	19.3	19.2
2	38.6	38.4
3	57.9	57.6
4	77.2	76.8
5	96.5	96.0
6	115.8	115.2
7	135.1	134.4
8	154.4	153.6
9	173.7	172.8

	191	190
1	19.1	19.0
2	38.2	38.0
3	57.3	57.0
4	76.4	76.0
5	95.5	95.0
6	114.6	114.0
7	133.7	133.0
8	152.8	152.0
9	171.9	171.0

	189	188
1	18.9	18.8
2	37.8	37.6
3	56.7	56.4
4	75.6	75.2
5	94.5	94.0
6	113.4	112.8
7	132.3	131.6
8	151.2	150.4
9	170.1	169.2

2300 — 2350

N.	0	1	2	3	4	5	6	7	8	9
2300	361 7278	7467	7656	7845̄	8034	8222	8411	8600	8789	8977
01	9166	9355̄	9544	9732	9921	0̄110	0̄298	0̄487	0̄676	0̄865̄
02	362 1053	1242	1430	1619	1808	1996	2185	2374	2562	2751
03	2939	3128	3317	3505	3694	3882	4071	4259	4448	4636
04	4825	5013	5202	5390	5579	5767	5956	6144	6332	6521
05	6709	6898	7086	7275̄	7463	7651	7840	8028	8216	8405̄
06	8593	8781	8970	9158	9346	9535̄	9723	9911	0̄099	0̄288
07	363 0476	0664	0852	1041	1229	1417	1605	1794	1982	2170
08	2358	2546	2734	2923	3111	3299	3487	3675	3863	4051
09	4239	4427	4615	4804	4992	5180	5368	5556	5744	5932
2310	6120	6308	6496	6684	6872	7060	7248	7436	7624	7812
11	7999	8187	8375	8563	8751	8939	9127	9315̄	9503	9690
12	9878	0̄066	0̄254	0̄442	0̄630	0̄817	1̄005	1̄193	1̄381	1̄569
13	364 1756	1944	2132	2320	2507	2695	2883	3070	3258	3446
14	3634	3821	4009	4197	4384	4572	4759	4947	5135̄	5322
15	5510	5698	5885	6073	6260	6448	6635	6823	7010	7198
16	7386	7573	7761	7948	8136	8323	8511	8698	8885	9073
17	9260	9448	9635	9823	0̄010	0̄197	0̄385̄	0̄572	0̄760	0̄947
18	365 1134	1322	1509	1696	1884	2071	2258	2446	2633	2820
19	3007	3195̄	3382	3569	3757	3944	4131	4318	4505	4693
2320	4880	5067	5254	5441	5629	5816	6003	6190	6377	6564
21	6751	6939	7126	7313	7500	7687	7874	8061	8248	8435
22	8622	8809	8996	9183	9370	9557	9744	9931	0̄118	0̄305
23	366 0492	0679	0866	1053	1240	1427	1614	1801	1987	2174
24	2361	2548	2735̄	2922	3109	3296	3482	3669	3856	4043
25	4230	4416	4603	4790	4977	5163	5350	5537	5724	5910
26	6097	6284	6471	6657	6844	7031	7217	7404	7591	7777
27	7964	8150	8337	8524	8710	8897	9083	9270	9457	9643
28	9830	0̄016	0̄203	0̄389	0̄576	0̄762	0̄949	1̄135	1̄322	1̄508
29	367 1695̄	1881	2068	2254	2441	2627	2814	3000	3186	3373
2330	3559	3746	3932	4118	4305̄	4491	4677	4864	5050	5236
31	5423	5609	5795	5982	6168	6354	6540	6727	6913	7099
32	7285	7472	7658	7844	8030	8217	8403	8589	8775	8961
33	9147	9334	9520	9706	9892	0̄078	0̄264	0̄450	0̄636	0̄822
34	368 1009	1195̄	1381	1567	1753	1939	2125̄	2311	2497	2683
35	2869	3055̄	3241	3427	3613	3799	3985̄	4171	4357	4542
36	4728	4914	5100	5286	5472	5658	5844	6030	6215	6401
37	6587	6773	6959	7145̄	7330	7516	7702	7888	8074	8259
38	8445	8631	8817	9002	9188	9374	9559	9745	9931	0̄117
39	369 0302	0488	0674	0859	1045̄	1230	1416	1602	1787	1973
2340	2159	2344	2530	2715	2901	3086	3272	3458	3643	3829
41	4014	4200	4385	4571	4756	4942	5127	5313	5498	5683
42	5869	6054	6240	6425	6611	6796	6981	7167	7352	7538
43	7723	7908	8094	8279	8464	8650	8835̄	9020	9205	9391
44	9576	9761	9947	0̄132	0̄317	0̄502	0̄688	0̄873	1̄058	1̄243
45	370 1428	1614	1799	1984	2169	2354	2540	2725̄	2910	3095̄
46	3280	3465	3650	3835	4020	4206	4391	4576	4761	4946
47	5131	5316	5501	5686	5871	6056	6241	6426	6611	6796
48	6981	7166	7351	7536	7721	7906	8091	8275	8460	8645
49	8830	9015	9200	9385̄	9570	9754	9939	0̄124	0̄309	0̄494
2350	371 0679	0863	1048	1233	1418	1603	1787	1972	2157	2342
N.	0	1	2	3	4	5	6	7	8	9

P. P.

	189	188
1	18.9	18.8
2	37.8	37.6
3	56.7	56.4
4	75.6	75.2
5	94.5	94.0
6	113.4	112.8
7	132.3	131.6
8	151.2	150.4
9	170.1	169.2

	187	186
1	18.7	18.6
2	37.4	37.2
3	56.1	55.8
4	74.8	74.4
5	93.5	93.0
6	112.2	111.6
7	130.9	130.2
8	149.6	148.8
9	168.3	167.4

	185	184
1	18.5	18.4
2	37.0	36.8
3	55.5	55.2
4	74.0	73.6
5	92.5	92.0
6	111.0	110.4
7	129.5	128.8
8	148.0	147.2
9	166.5	165.6

P. P.

N.	0	1	2	3	4	5	6	7	8	9
2350	371 0679	0863	1048	1233	1418	1603	1787	1972	2157	2342
51	2526	2711	2896	3080	3265	3450	3635	3819	4004	4189
52	4373	4558	4742	4927	5112	5296	5481	5666	5850	6035
53	6219	6404	6588	6773	6957	7142	7327	7511	7696	7880
54	8065	8249	8434	8618	8802	8987	9171	9356	9540	9725
55	9909	0̄094	0̄278	0̄462	0̄647	0̄831	1̄015	1̄200	1̄384	1̄569
56	372 1753	1937	2122	2306	2490	2674	2859	3043	3227	3412
57	3596	3780	3964	4149	4333	4517	4701	4885	5070	5254
58	5438	5622	5806	5991	6175	6359	6543	6727	6911	7095
59	7279	7464	7648	7832	8016	8200	8384	8568	8752	8936
2360	9120	9304	9488	9672	9856	0̄040	0̄224	0̄408	0̄592	0̄776
61	373 0960	1144	1328	1512	1696	1879	2063	2247	2431	2615
62	2799	2983	3167	3350	3534	3718	3902	4086	4270	4453
63	4637	4821	5005	5189	5372	5556	5740	5924	6107	6291
64	6475	6658	6842	7026	7210	7393	7577	7761	7944	8128
65	8311	8495	8679	8862	9046	9230	9413	9597	9780	9964
66	374 0147	0331	0515	0698	0882	1065	1249	1432	1616	1799
67	1983	2166	2350	2533	2716	2900	3083	3267	3450	3634
68	3817	4000	4184	4367	4551	4734	4917	5101	5284	5467
69	5651	5834	6017	6201	6384	6567	6750	6934	7117	7300
2370	7483	7667	7850	8033	8216	8400	8583	8766	8949	9132
71	9316	9499	9682	9865	0̄048	0̄231	0̄414	0̄598	0̄781	0̄964
72	375 1147	1330	1513	1696	1879	2062	2245	2428	2611	2794
73	2977	3160	3343	3526	3709	3892	4075	4258	4441	4624
74	4807	4990	5173	5356	5539	5722	5905	6088	6270	6453
75	6636	6819	7002	7185	7368	7550	7733	7916	8099	8282
76	8464	8647	8830	9013	9195	9378	9561	9744	9926	0̄109
77	376 0292	0475	0657	0840	1023	1205	1388	1571	1753	1936
78	2119	2301	2484	2666	2849	3032	3214	3397	3579	3762
79	3944	4127	4310	4492	4675	4857	5040	5222	5405	5587
2380	5770	5952	6135	6317	6499	6682	6864	7047	7229	7412
81	7594	7776	7959	8141	8323	8506	8688	8871	9053	9235
82	9418	9600	9782	9965	0̄147	0̄329	0̄511	0̄694	0̄876	1̄058
83	377 1240	1423	1605	1787	1969	2152	2334	2516	2698	2880
84	3063	3245	3427	3609	3791	3973	4155	4338	4520	4702
85	4884	5066	5248	5430	5612	5794	5976	6158	6340	6522
86	6704	6886	7068	7250	7432	7614	7796	7978	8160	8342
87	8524	8706	8888	9070	9252	9434	9616	9798	9979	0̄161
88	378 0343	0525	0707	0889	1071	1252	1434	1616	1798	1980
89	2161	2343	2525	2707	2889	3070	3252	3434	3616	3797
2390	3979	4161	4342	4524	4706	4887	5069	5251	5432	5614
91	5796	5977	6159	6341	6522	6704	6885	7067	7249	7430
92	7612	7793	7975	8156	8338	8519	8701	8882	9064	9245
93	9427	9608	9790	9971	0̄153	0̄334	0̄516	0̄697	0̄879	1̄060
94	379 1241	1423	1604	1786	1967	2148	2330	2511	2692	2874
95	3055	3237	3418	3599	3780	3962	4143	4324	4506	4687
96	4868	5049	5231	5412	5593	5774	5956	6137	6318	6499
97	6680	6862	7043	7224	7405	7586	7767	7948	8130	8311
98	8492	8673	8854	9035	9216	9397	9578	9759	9940	0̄121
99	380 0302	0484	0665	0846	1027	1208	1389	1570	1750	1931
2400	2112	2293	2474	2655	2836	3017	3198	3379	3560	3741
N.	0	1	2	3	4	5	6	7	8	9

P. P.

	185	184
1	18.5	18.4
2	37.0	36.8
3	55.5	55.2
4	74.0	73.6
5	92.5	92.0
6	111.0	110.4
7	129.5	128.8
8	148.0	147.2
9	166.5	165.6

	183	182
1	18.3	18.2
2	36.6	36.4
3	54.9	54.6
4	73.2	72.8
5	91.5	91.0
6	109.8	109.2
7	128.1	127.4
8	146.4	145.6
9	164.7	163.8

	181	180
1	18.1	18.0
2	36.2	36.0
3	54.3	54.0
4	72.4	72.0
5	90.5	90.0
6	108.6	108.0
7	126.7	126.0
8	144.8	144.0
9	162.9	162.0

P. P

N.	0	1	2	3	4	5	6	7	8	9	P. P.
2400	380 2112	2293	2474	2655	2836	3017	3198	3379	3560	3741	
01	3922	4102	4283	4464	4645	4826	5007	5188	5368	5549	181 1 18.1 2 36.2 3 54·3 4 72.4 5 90.5 6 108.6 7 126.7 8 144.8 9 162.9
02	5730	5911	6092	6272	6453	6634	6815̅	6995	7176	7357	
03	7538	7718	7899	8080	8261	8441	8622	8803	8983	9164	
04	9345̅	9525	9706	9887	0̅067	0̅248	0̅428	0̅609	0̅790	0̅970	
05	381 1151	1331	1512	1693	1873	2054	2234	2415̅	2595	2776	
06	2956	3137	3317	3498	3678	3859	4039	4220	4400	4580	
07	4761	4941	5122	5302	5483	5663	5843	6024	6204	6384	
08	6565̅	6745	6926	7106	7286	7467	7647	7827	8007	8188	
09	8368	8548	8729	8909	9089	9269	9450	9630	9810	9990	
2410	382 0170	0351	0531	0711	0891	1071	1252	1432	1612	1792	
11	1972	2152	2332	2512	2693	2873	3053	3233	3413	3593	180 1 18.0 2 36.0 3 54·0 4 72.0 5 90.0 6 108.0 7 126.0 8 144.0 9 162.0
12	3773	3953	4133	4313	4493	4673	4853	5033	5213	5393	
13	5573	5753	5933	6113	6293	6473	6653	6833	7013	7193	
14	7373	7553	7732	7912	8092	8272	8452	8632	8812	8992	
15	9171	9351	9531	9711	9891	0̅070	0̅250	0̅430	0̅610	0̅790	
16	383 0969	1149	1329	1509	1688	1868	2048	2227	2407	2587	
17	2767	2946	3126	3306	3485	3665̅	3844	4024	4204	4383	
18	4563	4743	4922	5102	5281	5461	5640	5820	6000	6179	
19	6359	6538	6718	6897	7077	7256	7436	7615	7795̅	7974	
2420	8154	8333	8513	8692	8871	9051	9230	9410	9589	9769	
21	9948	0̅127	0̅307	0̅486	0̅665	0̅845̅	1̅024	1̅203	1̅383	1̅562	179 1 17.9 2 35.8 3 53·7 4 71.6 5 89·5 6 107·4 7 125·3 8 143.2 9 161.1
22	384 1741	1921	2100	2279	2459	2638	2817	2996	3176	3355̅	
23	3534	3713	3893	4072	4251	4430	4609	4789	4968	5147	
24	5326	5505	5684	5864	6043	6222	6401	6580	6759	6938	
25	7117	7297	7476	7655̅	7834	8013	8192	8371	8550	8729	
26	8908	9087	9266	9445̅	9624	9803	9982	0̅161	0̅340	0̅519	
27	385 0698	0877	1056	1235̅	1413	1592	1771	1950	2129	2308	
28	2487	2666	2845̅	3023	3202	3381	3560	3739	3918	4096	
29	4275	4454	4633	4812	4990	5169	5348	5527	5705	5884	
2430	6063	6241	6420	6599	6778	6956	7135̅	7314	7492	7671	
31	7850	8028	8207	8386	8564	8743	8921	9100	9279	9457	178 1 17·8 2 35·6 3 53·4 4 71.2 5 89.0 6 106.8 7 124.6 8 142.4 9 160.2
32	9636	9814	9993	0̅171	0̅350	0̅528	0̅707	0̅886	1̅064	1̅243	
33	386 1421	1600	1778	1957	2135	2314	2492	2670	2849	3027	
34	3206	3384	3563	3741	3919	4098	4276	4455̅	4633	4811	
35	4990	5168	5346	5525̅	5703	5881	6060	6238	6416	6595̅	
36	6773	6951	7129	7308	7486	7664	7842	8021	8199	8377	
37	8555	8733	8912	9090	9268	9446	9624	9803	9981	0̅159	
38	387 0337	0515	0693	0871	1049	1228	1406	1584	1762	1940	
39	2118	2296	2474	2652	2830	3008	3186	3364	3542	3720	
2440	3898	4076	4254	4432	4610	4788	4966	5144	5322	5500	
41	5678	5856	6034	6212	6389	6567	6745	6923	7101	7279	177 1 17·7 2 35·4 3 53·1 4 70.8 5 88.5 6 106.2 7 123.9 8 141.6 9 159·3
42	7457	7634	7812	7990	8168	8346	8524	8701	8879	9057	
43	9235̅	9412	9590	9768	9946	0̅123	0̅301	0̅479	0̅657	0̅834	
44	388 1012	1190	1367	1545	1723	1900	2078	2256	2433	2611	
45	2789	2966	3144	3321	3499	3677	3854	4032	4209	4387	
46	4565̅	4742	4920	5097	5275̅	5452	5630	5807	5985̅	6162	
47	6340	6517	6695̅	6872	7050	7227	7404	7582	7759	7937	
48	8114	8292	8469	8646	8824	9001	9178	9356	9533	9711	
49	9888	0̅065	0̅243	0̅420	0̅597	0̅774	0̅952	1̅129	1̅306	1̅484	
2450	389 1661	1838	2015	2193	2370	2547	2724	2902	3079	3256	
N.	0	1	2	3	4	5	6	7	8	9	P. P.

N.	0	1	2	3	4	5	6	7	8	9
2450	389 1661	1838	2015	2193	2370	2547	2724	2902	3079	3256
51	3433	3610	3787	3965̄	4142	4319	4496	4673	4850	5028
52	5205̄	5382	5559	5736	5913	6090	6267	6444	6621	6798
53	6975	7153	7330	7507	7684	7861	8038	8215̄	8392	8569
54	8746	8923	9100	9276	9453	9630	9807	9984	0̄161	0̄338
55	390 0515̄	0692	0869	1046	1223	1399	1576	1753	1930	2107
56	2284	2460	2637	2814	2991	3168	3344	3521	3698	3875̄
57	4052	4228	4405	4582	4759	4935	5112	5289	5465	5642
58	5819	5995	6172	6349	6525	6702	6879	7055	7232	7409
59	7585	7762	7939	8115	8292	8468	8645̄	8821	8998	9175̄
2460	9351	9528	9704	9881	0̄057	0̄234	0̄410	0̄587	0̄763	0̄940
61	391 1116	1293	1469	1646	1822	1998	2175̄	2351	2528	2704
62	2880	3057	3233	3410	3586	3762	3939	4115	4291	4468
63	4644	4820	4997	5173	5349	5526	5702	5878	6055̄	6231
64	6407	6583	6760	6936	7112	7288	7464	7641	7817	7993
65	8169	8345	8522	8698	8874	9050	9226	9402	9578	9755̄
66	9931	0̄107	0̄283	0̄459	0̄635	0̄811	0̄987	1̄163	1̄339	1̄515
67	392 1691	1868	2044	2220	2396	2572	2748	2924	3100	3276
68	3452	3628	3803	3979	4155	4331	4507	4683	4859	5035̄
69	5211	5387	5563	5739	5914	6090	6266	6442	6618	6794
2470	6970	7145	7321	7497	7673	7849	8024	8200	8376	8552
71	8727	8903	9079	9255̄	9430	9606	9782	9958	0̄133	0̄309
72	393 0485̄	0660	0836	1012	1187	1363	1539	1714	1890	2066
73	2241	2417	2592	2768	2944	3119	3295̄	3470	3646	3821
74	3997	4172	4348	4524	4699	4875̄	5050	5226	5401	5577
75	5752	5928	6103	6278	6454	6629	6805̄	6980	7156	7331
76	7506	7682	7857	8033	8208	8383	8559	8734	8909	9085̄
77	9260	9435	9611	9786	9961	0̄137	0̄312	0̄487	0̄662	0̄838
78	394 1013	1188	1364	1539	1714	1889	2064	2240	2415̄	2590
79	2765	2940	3116	3291	3466	3641	3816	3991	4167	4342
2480	4517	4692	4867	5042	5217	5392	5567	5742	5918	6093
81	6268	6443	6618	6793	6968	7143	7318	7493	7668	7843
82	8018	8193	8368	8543	8718	8893	9068	9242	9417	9592
83	9767	9942	0̄117	0̄292	0̄467	0̄642	0̄817	0̄991	1̄166	1̄341
84	395 1516	1691	1866	2040	2215	2390	2565̄	2740	2914	3089
85	3264	3439	3613	3788	3963	4138	4312	4487	4662	4837
86	5011	5186	5361	5535	5710	5885̄	6059	6234	6409	6583
87	6758	6932	7107	7282	7456	7631	7805	7980	8155̄	8329
88	8504	8678	8853	9027	9202	9376	9551	9725	9900	0̄074
89	396 0249	0423	0598	0772	0947	1121	1296	1470	1645̄	1819
2490	1993	2168	2342	2517	2691	2865	3040	3214	3389	3563
91	3737	3912	4086	4260	4435̄	4609	4783	4958	5132	5306
92	5480	5655̄	5829	6003	6177	6352	6526	6700	6874	7049
93	7223	7397	7571	7745	7920	8094	8268	8442	8616	8790
94	8964	9139	9313	9487	9661	9835	0̄009	0̄183	0̄357	0̄531
95	397 0705	0880	1054	1228	1402	1576	1750	1924	2098	2272
96	2446	2620	2794	2968	3142	3316	3490	3664	3838	4011
97	4185	4359	4533	4707	4881	5055̄	5229	5403	5577	5750
98	5924	6098	6272	6446	6620	6794	6967	7141	7315̄	7489
99	7663	7836	8010	8184	8358	8531	8705	8879	9053	9226
2500	9400	9574	9748	9921	0̄095̄	0̄269	0̄442	0̄616	0̄790	0̄963
N.	0	1	2	3	4	5	6	7	8	9

P. P.	177	176	175	174	173
1	17.7	17.6	17.5	17.4	17.3
2	35.4	35.2	35.0	34.8	34.6
3	53.1	52.8	52.5	52.2	51.9
4	70.8	70.4	70.0	69.6	69.2
5	88.5	88.0	87.5	87.0	86.5
6	106.2	105.6	105.0	104.4	103.8
7	123.9	123.2	122.5	121.8	121.1
8	141.6	140.8	140.0	139.2	138.4
9	159.3	158.4	157.5	156.6	155.7

2500 — 2550

N.	0	1	2	3	4	5	6	7	8	9
2500	397 9400	9574	9748	9921	0̅095̅	0̅269	0̅442	0̅616	0̅790	0̅963
01	398 1137	1311	1484	1658	1831	2005	2179	2352	2526	2699
02	2873	3047	3220	3394	3567	3741	3914	4088	4261	4435̅
03	4608	4782	4956	5129	5302	5476	5649	5823	5996	6170
04	6343	6517	6690	6864	7037	7210	7384	7557	7731	7904
05	8077	8251	8424	8597	8771	8944	9117	9291	9464	9637
06	9811	9984	0̅157	0̅331	0̅504	0̅677	0̅850	1̅024	1̅197	1̅370
07	399 1543	1717	1890	2063	2236	2409	2583	2756	2929	3102
08	3275	3448	3622	3795̅	3968	4141	4314	4487	4660	4834
09	5007	5180	5353	5526	5699	5872	6045	6218	6391	6564
2510	6737	6910	7083	7256	7429	7602	7775	7948	8121	8294
11	8467	8640	8813	8986	9159	9332	9505̅	9678	9851	0̅023
12	400 0196	0369	0542	0715̅	0888	1061	1234	1406	1579	1752
13	1925̅	2098	2271	2443	2616	2789	2962	3134	3307	3480
14	3653	3825	3998	4171	4344	4516	4689	4862	5035̅	5207
15	5380	5553	5725	5898	6071	6243	6416	6588	6761	6934
16	7106	7279	7452	7624	7797	7969	8142	8314	8487	8660
17	8832	9005̅	9177	9350	9522	9695̅	9867	0̅040	0̅212	0̅385̅
18	401 0557	0730	0902	1075̅	1247	1420	1592	1764	1937	2109
19	2282	2454	2626	2799	2971	3144	3316	3488	3661	3833
2520	4005	4178	4350	4522	4695̅	4867	5039	5212	5384	5556
21	5728	5901	6073	6245	6417	6590	6762	6934	7106	7279
22	7451	7623	7795	7967	8140	8312	8484	8656	8828	9000
23	9173	9345̅	9517	9689	9861	0̅033	0̅205	0̅377	0̅549	0̅721
24	402 0894	1066	1238	1410	1582	1754	1926	2098	2270	2442
25	2614	2786	2958	3130	3302	3474	3646	3818	3990	4162
26	4333	4505	4677	4849	5021	5193	5365̅	5537	5709	5881
27	6052	6224	6396	6568	6740	6912	7083	7255	7427	7599
28	7771	7942	8114	8286	8458	8630	8801	8973	9145̅	9317
29	9488	9660	9832	0̅003	0̅175	0̅347	0̅519	0̅690	0̅862	1̅034
2530	403 1205	1377	1549	1720	1892	2063	2235	2407	2578	2750
31	2921	3093	3265̅	3436	3608	3779	3951	4122	4294	4465
32	4637	4809	4980	5152	5323	5495̅	5666	5838	6009	6180
33	6352	6523	6695̅	6866	7038	7209	7381	7552	7723	7895̅
34	8066	8237	8409	8580	8752	8923	9094	9266	9437	9608
35	9780	9951	0̅122	0̅294	0̅465̅	0̅636	0̅807	0̅979	1̅150	1̅321
36	404 1492	1664	1835̅	2006	2177	2349	2520	2691	2862	3033
37	3205̅	3376	3547	3718	3889	4061	4232	4403	4574	4745
38	4916	5087	5258	5429	5601	5772	5943	6114	6285̅	6456
39	6627	6798	6969	7140	7311	7482	7653	7824	7995	8166
2540	8337	8508	8679	8850	9021	9192	9363	9534	9705̅	9876
41	405 0047	0218	0388	0559	0730	0901	1072	1243	1414	1585̅
42	1755	1926	2097	2268	2439	2610	2780	2951	3122	3293
43	3464	3634	3805	3976	4147	4317	4488	4659	4830	5000
44	5171	5342	5512	5683	5854	6025̅	6195	6366	6537	6707
45	6878	7049	7219	7390	7560	7731	7902	8072	8243	8413
46	8584	8755	8925	9096	9266	9437	9607	9778	9948	0̅119
47	406 0289	0460	0630	0801	0971	1142	1312	1483	1653	1824
48	1994	2165̅	2335	2506	2676	2846	3017	3187	3358	3528
49	3698	3869	4039	4209	4380	4550	4721	4891	5061	5231
2550	5402	5572	5742	5913	6083	6253	6424	6594	6764	6934
N.	0	1	2	3	4	5	6	7	8	9

P. P.

	174
1	17.4
2	34.8
3	52.2
4	69.6
5	87.0
6	104.4
7	121.8
8	139.2
9	156.6

	173
1	17.3
2	34.6
3	51.9
4	69.2
5	86.5
6	103.8
7	121.1
8	138.4
9	155.7

	172
1	17.2
2	34.4
3	51.6
4	68.8
5	86.0
6	103.2
7	120.4
8	137.6
9	154.8

	171
1	17.1
2	34.2
3	51.3
4	68.4
5	85.5
6	102.6
7	119.7
8	136.8
9	153.9

	170
1	17.0
2	34.0
3	51.0
4	68.0
5	85.0
6	102.0
7	119.0
8	136.0
9	153.0

P. P.

N.	0	1	2	3	4	5	6	7	8	9
2550	406 5402	5572	5742	5913	6083	6253	6424	6594	6764	6934
51	7105̄	7275̄	7445	7615	7786	7956	8126	8296	8466	8637
52	8807	8977	9147	9317	9487	9658	9828	9998	0̄168	0̄338
53	407 0508	0678	0848	1018	1189	1359	1529	1699	1869	2039
54	2209	2379	2549	2719	2889	3059	3229	3399	3569	3739
55	3909	4079	4249	4419	4589	4759	4929	5099	5269	5439
56	5608	5778	5948	6118	6288	6458	6628	6798	6968	7137
57	7307	7477	7647	7817	7987	8156	8326	8496	8666	8836
58	9005	9175	9345̄	9515̄	9684	9854	0̄024	0̄194	0̄363	0̄533
59	408 0703	0873	1042	1212	1382	1551	1721	1891	2060	2230
2560	2400	2569	2739	2909	3078	3248	3417	3587	3757	3926
61	4096	4265	4435̄	4604	4774	4944	5113	5283	5452	5622
62	5791	5961	6130	6300	6469	6639	6808	6978	7147	7317
63	7486	7656	7825̄	7994	8164	8333	8503	8672	8841	9011
64	9180	9350	9519	9688	9858	0̄027	0̄196	0̄366	0̄535	0̄704
65	409 0874	1043	1212	1382	1551	1720	1889	2059	2228	2397
66	2567	2736	2905	3074	3243	3413	3582	3751	3920	4089
67	4259	4428	4597	4766	4935	5105̄	5274	5443	5612	5781
68	5950	6119	6288	6458	6627	6796	6965̄	7134	7303	7472
69	7641	7810	7979	8148	8317	8486	8655	8824	8993	9162
2570	9331	9500	9669	9838	0̄007	0̄176	0̄345	0̄514	0̄683	0̄852
71	410 1021	1190	1359	1527	1696	1865	2034	2203	2372	2541
72	2710	2878	3047	3216	3385	3554	3723	3891	4060	4229
73	4398	4567	4735	4904	5073	5242	5410	5579	5748	5917
74	6085	6254	6423	6592	6760	6929	7098	7266	7435	7604
75	7772	7941	8110	8278	8447	8616	8784	8953	9121	9290
76	9459	9627	9796	9964	0̄133	0̄301	0̄470	0̄639	0̄807	0̄976
77	411 1144	1313	1481	1650	1818	1987	2155	2324	2492	2661
78	2829	2998	3166	3334	3503	3671	3840	4008	4177	4345
79	4513	4682	4850	5019	5187	5355	5524	5692	5860	6029
2580	6197	6365	6534	6702	6870	7039	7207	7375	7544	7712
81	7880	8048	8217	8385̄	8553	8721	8890	9058	9226	9394
82	9562	9731	9899	0̄067	0̄235	0̄403	0̄571	0̄740	0̄908	1̄076
83	412 1244	1412	1580	1748	1917	2085̄	2253	2421	2589	2757
84	2925	3093	3261	3429	3597	3765	3933	4101	4269	4437
85	4605	4773	4941	5109	5277	5445	5613	5781	5949	6117
86	6285	6453	6621	6789	6957	7125̄	7293	7461	7629	7796
87	7964	8132	8300	8468	8636	8804	8971	9139	9307	9475̄
88	9643	9811	9978	0̄146	0̄314	0̄482	0̄649	0̄817	0̄985̄	1̄153
89	413 1321	1488	1656	1824	1991	2159	2327	2495̄	2662	2830
2590	2998	3165	3333	3501	3668	3836	4004	4171	4339	4507
91	4674	4842	5009	5177	5345̄	5512	5680	5847	6015̄	6182
92	6350	6518	6685	6853	7020	7188	7355	7523	7690	7858
93	8025	8193	8360	8528	8695	8863	9030	9197	9365̄	9532
94	9700	9867	0̄035̄	0̄202	0̄369	0̄537	0̄704	0̄872	1̄039	1̄206
95	414 1374	1541	1708	1876	2043	2210	2378	2545̄	2712	2880
96	3047	3214	3381	3549	3716	3883	4051	4218	4385	4552
97	4719	4887	5054	5221	5388	5556	5723	5890	6057	6224
98	6391	6559	6726	6893	7060	7227	7394	7561	7729	7896
99	8063	8230	8397	8564	8731	8898	9065	9232	9399	9566
2600	9733	9901	0̄068	0̄235̄	0̄402	0̄569	0̄736	0̄903	1̄070	1̄237
N.	0	1	2	3	4	5	6	7	8	9

P. P.

	171
1	17.1
2	34.2
3	51.3
4	68.4
5	85.5
6	102.6
7	119.7
8	136.8
9	153.9

	170
1	17.0
2	34.0
3	51.0
4	68.0
5	85.0
6	102.0
7	119.0
8	136.0
9	153.0

	169
1	16.9
2	33.8
3	50.7
4	67.6
5	84.5
6	101.4
7	118.3
8	135.2
9	152.1

	168
1	16.8
2	33.6
3	50.4
4	67.2
5	84.0
6	100.8
7	117.6
8	134.4
9	151.2

	167
1	16.7
2	33.4
3	50.1
4	66.8
5	83.5
6	100.2
7	116.9
8	133.6
9	150.3

P. P.

N.	0	1	2	3	4	5	6	7	8	9	P. P.
2600	414 9733	9901	0̄068	0̄235̄	0̄402	0̄569	0̄736	0̄903	1̄070	1̄237	
01	415 1404	1570	1737	1904	2071	2238	2405	2572	2739	2906	168 1 16.8 2 33.6 3 50.4 4 67.2 5 84.0 6 100.8 7 117.6 8 134.4 9 151.2
02	3073	3240	3407	3574	3741	3907	4074	4241	4408	4575̄	
03	4742	4909	5075	5242	5409	5576	5743	5909	6076	6243	
04	6410	6577	6743	6910	7077	7244	7410	7577	7744	7911	
05	8077	8244	8411	8577	8744	8911	9077	9244	9411	9577	
06	9744	9911	0̄077	0̄244	0̄411	0̄577	0̄744	0̄911	1̄077	1̄244	
07	416 1410	1577	1743	1910	2077	2243	2410	2576	2743	2909	
08	3076	3242	3409	3575	3742	3908	4075̄	4241	4408	4574	
09	4741	4907	5074	5240	5407	5573	5739	5906	6072	6239	
2610	6405	6571	6738	6904	7071	7237	7403	7570	7736	7902	
11	8069	8235	8401	8568	8734	8900	9067	9233	9399	9565	167 1 16.7 2 33.4 3 50.1 4 66.8 5 83.5 6 100.2 7 116.9 8 133.6 9 150.3
12	9732	9898	0̄064	0̄231	0̄397	0̄563	0̄729	0̄895	1̄062	1̄228	
13	417 1394	1560	1726	1893	2059	2225	2391	2557	2724	2890	
14	3056	3222	3388	3554	3720	3886	4053	4219	4385̄	4551	
15	4717	4883	5049	5215	5381	5547	5713	5879	6045	6211	
16	6377	6543	6709	6875	7041	7207	7373	7539	7705	7871	
17	8037	8203	8369	8535	8701	8867	9033	9199	9365̄	9531	
18	9696	9862	0̄028	0̄194	0̄360	0̄526	0̄692	0̄857	1̄023	1̄189	
19	418 1355̄	1521	1687	1852	2018	2184	2350	2516	2681	2847	
2620	3013	3179	3344	3510	3676	3842	4007	4173	4339	4505̄	
21	4670	4836	5002	5167	5333	5499	5664	5830	5996	6161	166 1 16.6 2 33.2 3 49.8 4 66.4 5 83.0 6 99.6 7 116.2 8 132.8 9 149.4
22	6327	6493	6658	6824	6989	7155̄	7321	7486	7652	7817	
23	7983	8148	8314	8480	8645	8811	8976	9142	9307	9473	
24	9638	9804	9969	0̄135̄	0̄300	0̄466	0̄631	0̄797	0̄962	1̄128	
25	419 1293	1459	1624	1789	1955̄	2120	2286	2451	2616	2782	
26	2947	3113	3278	3443	3609	3774	3939	4105̄	4270	4435	
27	4601	4766	4931	5097	5262	5427	5593	5758	5923	6088	
28	6254	6419	6584	6749	6915̄	7080	7245	7410	7575	7741	
29	7906	8071	8236	8401	8567	8732	8897	9062	9227	9392	
2630	9557	9723	9888	0̄053	0̄218	0̄383	0̄548	0̄713	0̄878	1̄043	
31	420 1208	1374	1539	1704	1869	2034	2199	2364	2529	2694	165 1 16.5 2 33.0 3 49.5 4 66.0 5 82.5 6 99.0 7 115.5 8 132.0 9 148.5
32	2859	3024	3189	3354	3519	3684	3849	4014	4179	4344	
33	4509	4674	4838	5003	5168	5333	5498	5663	5828	5993	
34	6158	6323	6487	6652	6817	6982	7147	7312	7477	7641	
35	7806	7971	8136	8301	8465	8630	8795̄	8960	9125̄	9289	
36	9454	9619	9784	9948	0̄113	0̄278	0̄442	0̄607	0̄772	0̄937	
37	421 1101	1266	1431	1595	1760	1925̄	2089	2254	2419	2583	
38	2748	2913	3077	3242	3406	3571	3736	3900	4065̄	4229	
39	4394	4558	4723	4888	5052	5217	5381	5546	5710	5875̄	
2640	6039	6204	6368	6533	6697	6862	7026	7191	7355	7520	
41	7684	7848	8013	8177	8342	8506	8671	8835̄	8999	9164	164 1 16.4 2 32.8 3 49.2 4 65.6 5 82.0 6 98.4 7 114.8 8 131.2 9 147.6
42	9328	9493	9657	9821	9986	0̄150	0̄314	0̄479	0̄643	0̄807	
43	422 0972	1136	1300	1465̄	1629	1793	1957	2122	2286	2450	
44	2615̄	2779	2943	3107	3271	3436	3600	3764	3928	4093	
45	4257	4421	4585	4749	4913	5078	5242	5406	5570	5734	
46	5898	6063	6227	6391	6555̄	6719	6883	7047	7211	7375	
47	7539	7703	7868	8032	8196	8360	8524	8688	8852	9016	
48	9180	9344	9508	9672	9836	0̄000	0̄164	0̄328	0̄492	0̄656	
49	423 0820	0984	1147	1311	1475	1639	1803	1967	2131	2295̄	
2650	2459	2623	2786	2950	3114	3278	3442	3606	3770	3933	
N.	0	1	2	3	4	5	6	7	8	9	P. P.

N.	0	1	2	3	4	5	6	7	8	9
2650	423 2459	2623	2786	2950	3114	3278	3442	3606	3770	3933
51	4097	4261	4425̄	4589	4753	4916	5080	5244	5408	5571
52	5735	5899	6063	6226	6390	6554	6718	6881	7045	7209
53	7372	7536	7700	7864	8027	8191	8355̄	8518	8682	8846
54	9009	9173	9336	9500	9664	9827	9991	0̄154	0̄318	0̄482
55	424 0645	0809	0972	1136	1300	1463	1627	1790	1954	2117
56	2281	2444	2608	2771	2935̄	3098	3262	3425	3589	3752
57	3916	4079	4242	4406	4569	4733	4896	5060	5223	5386
58	5550	5713	5877	6040	6203	6367	6530	6693	6857	7020
59	7183	7347	7510	7673	7837	8000	8163	8327	8490	8653
2660	8816	8980	9143	9306	9469	9633	9796	9959	0̄122	0̄286
61	425 0449	0612	0775	0938	1102	1265̄	1428	1591	1754	1917
62	2081	2244	2407	2570	2733	2896	3059	3222	3385	3549
63	3712	3875̄	4038	4201	4364	4527	4690	4853	5016	5179
64	5342	5505	5668	5831	5994	6157	6320	6483	6646	6809
65	6972	7135	7298	7461	7624	7787	7950	8113	8276	8439
66	8601	8764	8927	9090	9253	9416	9579	9742	9904	0̄067
67	426 0230	0393	0556	0719	0881	1044	1207	1370	1533	1695
68	1858	2021	2184	2347	2509	2672	2835̄	2998	3160	3323
69	3486	3648	3811	3974	4137	4299	4462	4625̄	4787	4950
2670	5113	5275	5438	5601	5763	5926	6088	6251	6414	6576
71	6739	6901	7064	7227	7389	7552	7714	7877	8039	8202
72	8365̄	8527	8690	8852	9015̄	9177	9340	9502	9665̄	9827
73	9990	0̄152	0̄315̄	0̄477	0̄639	0̄802	0̄964	1̄127	1̄289	1̄452
74	427 1614	1776	1939	2101	2264	2426	2588	2751	2913	3076
75	3238	3400	3563	3725̄	3887	4050	4212	4374	4536	4699
76	4861	5023	5186	5348	5510	5672	5835̄	5997	6159	6321
77	6484	6646	6808	6970	7133	7295̄	7457	7619	7781	7944
78	8106	8268	8430	8592	8754	8917	9079	9241	9403	9565
79	9727	9889	0̄051	0̄213	0̄376	0̄538	0̄700	0̄862	1̄024	1̄186
2680	428 1348	1510	1672	1834	1996	2158	2320	2482	2644	2806
81	2968	3130	3292	3454	3616	3778	3940	4102	4264	4426
82	4588	4750	4912	5073	5235	5397	5559	5721	5883	6045̄
83	6207	6369	6530	6692	6854	7016	7178	7340	7501	7663
84	7825	7987	8149	8311	8472	8634	8796	8958	9119	9281
85	9443	9605̄	9766	9928	0̄090	0̄252	0̄413	0̄575̄	0̄737	0̄898
86	429 1060	1222	1383	1545	1707	1868	2030	2192	2353	2515
87	2677	2838	3000	3162	3323	3485̄	3646	3808	3969	4131
88	4293	4454	4616	4777	4939	5100	5262	5423	5585̄	5747
89	5908	6070	6231	6393	6554	6715	6877	7038	7200	7361
2690	7523	7684	7846	8007	8169	8330	8491	8653	8814	8976
91	9137	9298	9460	9621	9782	9944	0̄105	0̄267	0̄428	0̄589
92	430 0751	0912	1073	1235̄	1396	1557	1718	1880	2041	2202
93	2364	2525̄	2686	2847	3009	3170	3331	3492	3653	3815̄
94	3976	4137	4298	4460	4621	4782	4943	5104	5265	5427
95	5588	5749	5910	6071	6232	6393	6554	6716	6877	7038
96	7199	7360	7521	7682	7843	8004	8165	8326	8487	8648
97	8809	8970	9132	9293	9454	9615̄	9776	9937	0̄098	0̄258
98	431 0419	0580	0741	0902	1063	1224	1385	1546	1707	1868
99	2029	2190	2351	2512	2672	2833	2994	3155	3316	3477
2700	3638	3798	3959	4120	4281	4442	4603	4763	4924	5085
N.	0	1	2	3	4	5	6	7	8	9

P. P.

	164
1	16.4
2	32.8
3	49.2
4	65.6
5	82.0
6	98.4
7	114.8
8	131.2
9	147.6

	163
1	16.3
2	32.6
3	48.9
4	65.2
5	81.5
6	97.8
7	114.1
8	130.4
9	146.7

	162
1	16.2
2	32.4
3	48.6
4	64.8
5	81.0
6	97.2
7	113.4
8	129.6
9	145.8

	161
1	16.1
2	32.2
3	48.3
4	64.4
5	80.5
6	96.6
7	112.7
8	128.8
9	144.9

	160
1	16.0
2	32.0
3	48.0
4	64.0
5	80.0
6	96.0
7	112.0
8	128.0
9	144.0

P. P.

N.	0	1	2	3	4	5	6	7	8	9	P. P.
2700	431 3638	3798	3959	4120	4281	4442	4603	4763	4924	5085	
01	5246	5407	5567	5728	5889	6050	6210	6371	6532	6693	
02	6853	7014	7175̄	7336	7496	7657	7818	7978	8139	8300	
03	8460	8621	8782	8942	9103	9264	9424	9585	9746	9906	
04	432 0067	0227	0388	0549	0709	0870	1030	1191	1352	1512	161 1 16.1 2 32.2 3 48.3 4 64.4 5 80.5 6 96.6 7 112.7 8 128.8 9 144.9
05	1673	1833	1994	2154	2315̄	2475	2636	2796	2957	3117	
06	3278	3438	3599	3759	3920	4080	4241	4401	4562	4722	
07	4883	5043	5203	5364	5524	5685̄	5845	6005	6166	6326	
08	6487	6647	6807	6968	7128	7288	7449	7609	7769	7930	
09	8090	8250	8411	8571	8731	8892	9052	9212	9372	9533	
2710	9693	9853	0̄013	0̄174	0̄334	0̄494	0̄654	0̄815̄	0̄975̄	1̄135̄	
11	433 1295	1455	1616	1776	1936	2096	2256	2416	2577	2737	
12	2897	3057	3217	3377	3537	3697	3858	4018	4178	4338	
13	4498	4658	4818	4978	5138	5298	5458	5618	5778	5938	
14	6098	6258	6418	6578	6738	6898	7058	7218	7378	7538	
15	7698	7858	8018	8178	8338	8498	8658	8818	8978	9138	
16	9298	9458	9617	9777	9937	0̄097	0̄257	0̄417	0̄577	0̄737	160 1 16.0 2 32.0 3 48.0 4 64.0 5 80.0 6 96.0 7 112.0 8 128.0 9 144.0
17	434 0896	1056	1216	1376	1536	1696	1855	2015	2175̄	2335̄	
18	2495̄	2654	2814	2974	3134	3293	3453	3613	3773	3932	
19	4092	4252	4412	4571	4731	4891	5050	5210	5370	5529	
2720	5689	5849	6008	6168	6328	6487	6647	6807	6966	7126	
21	7285	7445	7605̄	7764	7924	8083	8243	8403	8562	8722	
22	8881	9041	9200	9360	9519	9679	9838	9998	0̄157	0̄317	
23	435 0476	0636	0795	0955̄	1114	1274	1433	1593	1752	1912	
24	2071	2230	2390	2549	2709	2868	3028	3187	3346	3506	
25	3665	3824	3984	4143	4303	4462	4621	4781	4940	5099	
26	5259	5418	5577	5736	5896	6055	6214	6374	6533	6692	
27	6851	7011	7170	7329	7488	7648	7807	7966	8125	8284	159 1 15.9 2 31.8 3 47.7 4 63.6 5 79.5 6 95.4 7 111.3 8 127.2 9 143.1
28	8444	8603	8762	8921	9080	9240	9399	9558	9717	9876	
29	436 0035	0194	0354	0513	0672	0831	0990	1149	1308	1467	
2730	1626	1786	1945̄	2104	2263	2422	2581	2740	2899	3058	
31	3217	3376	3535	3694	3853	4012	4171	4330	4489	4648	
32	4807	4966	5125̄	5284	5443	5602	5761	5920	6078	6237	
33	6396	6555	6714	6873	7032	7191	7350	7509	7667	7826	
34	7985	8144	8303	8462	8620	8779	8938	9097	9256	9415̄	
35	9573	9732	9891	0̄050	0̄208	0̄367	0̄526	0̄685̄	0̄843	1̄002	
36	437 1161	1320	1478	1637	1796	1955̄	2113	2272	2431	2589	
37	2748	2907	3065	3224	3383	3541	3700	3859	4017	4176	
38	4334	4493	4652	4810	4969	5127	5286	5445̄	5603	5762	
39	5920	6079	6237	6396	6555̄	6713	6872	7030	7189	7347	158 1 15.8 2 31.6 3 47.4 4 63.2 5 79.0 6 94.8 7 110.6 8 126.4 9 142.2
2740	7506	7664	7823	7981	8140	8298	8457	8615̄	8773	8932	
41	9090	9249	9407	9566	9724	9883	0̄041	0̄199	0̄358	0̄516	
42	438 0675̄	0833	0991	1150	1308	1466	1625̄	1783	1941	2100	
43	2258	2416	2575̄	2733	2891	3050	3208	3366	3525̄	3683	
44	3841	3999	4158	4316	4474	4632	4791	4949	5107	5265	
45	5423	5582	5740	5898	6056	6214	6373	6531	6689	6847	
46	7005	7163	7322	7480	7638	7796	7954	8112	8270	8428	
47	8587	8745̄	8903	9061	9219	9377	9535	9693	9851	0̄009	
48	439 0167	0325	0483	0641	0799	0957	1115	1273	1431	1589	
49	1747	1905	2063	2221	2379	2537	2695	2853	3011	3169	
2750	3327	3485̄	3643	3801	3959	4116	4274	4432	4590	4748	
N.	0	1	2	3	4	5	6	7	8	9	P. P.

2750 — 2800

N.	0	1	2	3	4	5	6	7	8	9
2750	439 3327	3485̄	3643	3801	3959	4116	4274	4432	4590	4748
51	4906	5064	5222	5379	5537	5695	5853	6011	6169	6326
52	6484	6642	6800	6958	7115	7273	7431	7589	7747	7904
53	8062	8220	8378	8535	8693	8851	9009	9166	9324	9482
54	9639	9797	9955̄	0̄112	0̄270	0̄428	0̄585	0̄743	0̄901	1̄058
55	440 1216	1374	1531	1689	1847	2004	2162	2319	2477	2635̄
56	2792	2950	3107	3265̄	3422	3580	3738	3895	4053	4210
57	4368	4525	4683	4840	4998	5155	5313	5470	5628	5785
58	5943	6100	6258	6415̄	6572	6730	6887	7045̄	7202	7360
59	7517	7674	7832	7989	8147	8304	8461	8619	8776	8933
2760	9091	9248	9406	9563	9720	9878	0̄035̄	0̄192	0̄349	0̄507
61	441 0664	0821	0979	1136	1293	1450	1608	1765̄	1922	2080
62	2237	2394	2551	2708	2866	3023	3180	3337	3494	3652
63	3809	3966	4123	4280	4438	4595̄	4752	4909	5066	5223
64	5380	5538	5695̄	5852	6009	6166	6323	6480	6637	6794
65	6951	7108	7265	7423	7580	7737	7894	8051	8208	8365̄
66	8522	8679	8836	8993	9150	9307	9464	9621	9778	9935̄
67	442 0092	0249	0405	0562	0719	0876	1033	1190	1347	1504
68	1661	1818	1975̄	2132	2288	2445	2602	2759	2916	3073
69	3230	3386	3543	3700	3857	4014	4171	4327	4484	4641
2770	4798	4954	5111	5268	5425̄	5582	5738	5895	6052	6209
71	6365	6522	6679	6835	6992	7149	7306	7462	7619	7776
72	7932	8089	8246	8402	8559	8716	8872	9029	9185	9342
73	9499	9655	9812	9969	0̄125	0̄282	0̄438	0̄595̄	0̄751	0̄908
74	443 1065̄	1221	1378	1534	1691	1847	2004	2160	2317	2473
75	2630	2786	2943	3099	3256	3412	3569	3725	3882	4038
76	4195̄	4351	4507	4664	4820	4977	5133	5290	5446	5602
77	5759	5915	6072	6228	6384	6541	6697	6853	7010	7166
78	7322	7479	7635	7791	7948	8104	8260	8417	8573	8729
79	8885	9042	9198	9354	9511	9667	9823	9979	0̄136	0̄292
2780	444 0448	0604	0760	0917	1073	1229	1385	1541	1698	1854
81	2010	2166	2322	2478	2635̄	2791	2947	3103	3259	3415
82	3571	3727	3883	4040	4196	4352	4508	4664	4820	4976
83	5132	5288	5444	5600	5756	5912	6068	6224	6380	6536
84	6692	6848	7004	7160	7316	7472	7628	7784	7940	8096
85	8252	8408	8564	8720	8876	9032	9188	9343	9499	9655
86	9811	9967	0̄123	0̄279	0̄435̄	0̄590	0̄746	0̄902	1̄058	1̄214
87	445 1370	1526	1681	1837	1993	2149	2305̄	2460	2616	2772
88	2928	3083	3239	3395̄	3551	3706	3862	4018	4174	4329
89	4485	4641	4797	4952	5108	5264	5419	5575	5731	5886
2790	6042	6198	6353	6509	6665̄	6820	6976	7132	7287	7443
91	7598	7754	7910	8065	8221	8376	8532	8687	8843	8999
92	9154	9310	9465	9621	9776	9932	0̄087	0̄243	0̄398	0̄554
93	446 0709	0865̄	1020	1176	1331	1487	1642	1798	1953	2109
94	2264	2419	2575̄	2730	2886	3041	3197	3352	3507	3663
95	3818	3974	4129	4284	4440	4595̄	4750	4906	5061	5216
96	5372	5527	5682	5838	5993	6148	6304	6459	6614	6769
97	6925̄	7080	7235	7390	7546	7701	7856	8011	8167	8322
98	8477	8632	8788	8943	9098	9253	9408	9563	9719	9874
99	447 0029	0184	0339	0494	0650	0805̄	0960	1115̄	1270	1425
2800	1580	1735	1891	2046	2201	2356	2511	2666	2821	2976
N.	0	1	2	3	4	5	6	7	8	9

P. P.	158	157	156	155
1	15.8	15.7	15.6	15.5
2	31.6	31.4	31.2	31.0
3	47.4	47.1	46.8	46.5
4	63.2	62.8	62.4	62.0
5	79.0	78.5	78.0	77.5
6	94.8	94.2	93.6	93.0
7	110.6	109.9	109.2	108.5
8	126.4	125.6	124.8	124.0
9	142.2	141.3	140.4	139.5

2800 — 2850

N.	0	1	2	3	4	5	6	7	8	9	P. P.
2800	447 1580	1735	1891	2046	2201	2356	2511	2666	2821	2976	
01	3131	3286	3441	3596	3751	3906	4061	4216	4371	4526	
02	4681	4836	4991	5146	5301	5456	5611	5766	5921	6076	
03	6231	6386	6541	6696	6851	7006	7161	7315	7470	7625	
04	7780	7935̄	8090	8245̄	8400	8554	8709	8864	9019	9174	156 1 15.6 2 31.2 3 46.8 4 62.4 5 78.0 6 93.6 7 109.2 8 124.8 9 140.4
05	9329	9483	9638	9793	9948	0̄103	0̄258	0̄412	0̄567	0̄722	
06	448 0877	1031	1186	1341	1496	1650	1805	1960	2115̄	2269	
07	2424	2579	2734	2888	3043	3198	3352	3507	3662	3816	
08	3971	4126	4280	4435̄	4590	4744	4899	5054	5208	5363	
09	5517	5672	5827	5981	6136	6290	6445̄	6600	6754	6909	
2810	7063	7218	7372	7527	7681	7836	7990	8145̄	8299	8454	
11	8608	8763	8917	9072	9226	9381	9535	9690	9844	9999	
12	449 0153	0308	0462	0616	0771	0925	1080	1234	1389	1543	
13	1697	1852	2006	2160	2315̄	2469	2624	2778	2932	3087	
14	3241	3395	3550	3704	3858	4013	4167	4321	4475	4630	
15	4784	4938	5093	5247	5401	5555	5710	5864	6018	6172	155 1 15.5 2 31.0 3 46.5 4 62.0 5 77.5 6 93.0 7 108.5 8 124.0 9 139.5
16	6327	6481	6635̄	6789	6943	7098	7252	7406	7560	7714	
17	7868	8023	8177	8331	8485	8639	8793	8948	9102	9256	
18	9410	9564	9718	9872	0̄026	0̄180	0̄334	0̄489	0̄643	0̄797	
19	450 0951	1105̄	1259	1413	1567	1721	1875	2029	2183	2337	
2820	2491	2645	2799	2953	3107	3261	3415	3569	3723	3877	
21	4031	4185̄	4339	4493	4647	4801	4954	5108	5262	5416	
22	5570	5724	5878	6032	6186	6340	6493	6647	6801	6955̄	
23	7109	7263	7416	7570	7724	7878	8032	8186	8339	8493	
24	8647	8801	8954	9108	9262	9416	9570	9723	9877	0̄031	
25	451 0185̄	0338	0492	0646	0799	0953	1107	1261	1414	1568	
26	1722	1875	2029	2183	2336	2490	2644	2797	2951	3104	
27	3258	3412	3565	3719	3873	4026	4180	4333	4487	4640	154 1 15.4 2 30.8 3 46.2 4 61.6 5 77.0 6 92.4 7 107.8 8 123.2 9 138.6
28	4794	4948	5101	5255̄	5408	5562	5715	5869	6022	6176	
29	6329	6483	6636	6790	6943	7097	7250	7404	7557	7711	
2830	7864	8018	8171	8325̄	8478	8632	8785	8938	9092	9245	
31	9399	9552	9705	9859	0̄012	0̄166	0̄319	0̄472	0̄626	0̄779	
32	452 0932	1086	1239	1393	1546	1699	1853	2006	2159	2312	
33	2466	2619	2772	2926	3079	3232	3385	3539	3692	3845	
34	3998	4152	4305̄	4458	4611	4765̄	4918	5071	5224	5377	
35	5531	5684	5837	5990	6143	6297	6450	6603	6756	6909	
36	7062	7215	7369	7522	7675̄	7828	7981	8134	8287	8440	
37	8593	8746	8900	9053	9206	9359	9512	9665̄	9818	9971	
38	453 0124	0277	0430	0583	0736	0889	1042	1195̄	1348	1501	
39	1654	1807	1960	2113	2266	2419	2572	2725̄	2878	3030	153 1 15.3 2 30.6 3 45.9 4 61.2 5 76.5 6 91.8 7 107.1 8 122.4 9 137.7
2840	3183	3336	3489	3642	3795	3948	4101	4254	4407	4559	
41	4712	4865	5018	5171	5324	5477	5629	5782	5935	6088	
42	6241	6394	6546	6699	6852	7005̄	7158	7310	7463	7616	
43	7769	7921	8074	8227	8380	8532	8685	8838	8990	9143	
44	9296	9449	9601	9754	9907	0̄059	0̄212	0̄365̄	0̄517	0̄670	
45	454 0823	0975	1128	1281	1433	1586	1739	1891	2044	2196	
46	2349	2502	2654	2807	2959	3112	3264	3417	3570	3722	
47	3875̄	4027	4180	4332	4485̄	4637	4790	4942	5095̄	5247	
48	5400	5552	5705̄	5857	6010	6162	6315̄	6467	6620	6772	
49	6924	7077	7229	7382	7534	7687	7839	7991	8144	8296	
2850	8449	8601	8753	8906	9058	9210	9363	9515	9668	9820	
N.	0	1	2	3	4	5	6	7	8	9	P. P.

N.	0	1	2	3	4	5	6	7	8	9
2850	454 8449	8601	8753	8906	9058	9210	9363	9515	9668	9820
51	9972	0̄125̄	0̄277	0̄429	0̄581	0̄734	0̄886	1̄038	1̄191	1̄343
52	455 1495	1647	1800	1952	2104	2257	2409	2561	2713	2865̄
53	3018	3170	3322	3474	3627	3779	3931	4083	4235	4388
54	4540	4692	4844	4996	5148	5300	5453	5605̄	5757	5909
55	6061	6213	6365	6517	6670	6822	6974	7126	7278	7430
56	7582	7734	7886	8038	8190	8342	8494	8646	8798	8950
57	9102	9254	9406	9558	9710	9862	0̄014	0̄166	0̄318	0̄470
58	456 0622	0774	0926	1078	1230	1382	1534	1686	1838	1990
59	2142	2293	2445	2597	2749	2901	3053	3205̄	3357	3508
2860	3660	3812	3964	4116	4268	4420	4571	4723	4875̄	5027
61	5179	5330	5482	5634	5786	5938	6089	6241	6393	6545̄
62	6696	6848	7000	7152	7303	7455̄	7607	7758	7910	8062
63	8213	8365	8517	8669	8820	8972	9124	9275	9427	9578
64	9730	9882	0̄033	0̄185	0̄337	0̄488	0̄640	0̄791	0̄943	1̄095̄
65	457 1246	1398	1549	1701	1853	2004	2156	2307	2459	2610
66	2762	2913	3065̄	3216	3368	3519	3671	3822	3974	4125
67	4277	4428	4580	4731	4883	5034	5186	5337	5489	5640
68	5791	5943	6094	6246	6397	6549	6700	6851	7003	7154
69	7305	7457	7608	7760	7911	8062	8214	8365̄	8516	8668
2870	8819	8970	9122	9273	9424	9576	9727	9878	0̄029	0̄181
71	458 0332	0483	0634	0786	0937	1088	1239	1391	1542	1693
72	1844	1996	2147	2298	2449	2600	2752	2903	3054	3205
73	3356	3507	3659	3810	3961	4112	4263	4414	4565	4717
74	4868	5019	5170	5321	5472	5623	5774	5925	6076	6227
75	6378	6530	6681	6832	6983	7134	7285̄	7436	7587	7738
76	7889	8040	8191	8342	8493	8644	8795̄	8946	9097	9248
77	9399	9550	9701	9851	0̄002	0̄153	0̄304	0̄455	0̄606	0̄757
78	459 0908	1059	1210	1361	1511	1662	1813	1964	2115̄	2266
79	2417	2567	2718	2869	3020	3171	3322	3472	3623	3774
2880	3925̄	4076	4226	4377	4528	4679	4830	4980	5131	5282
81	5433	5583	5734	5885̄	6036	6186	6337	6488	6638	6789
82	6940	7090	7241	7392	7542	7693	7844	7994	8145	8296
83	8446	8597	8748	8898	9049	9200	9350	9501	9651	9802
84	9953	0̄103	0̄254	0̄404	0̄555̄	0̄705	0̄856	1̄007	1̄157	1̄308
85	460 1458	1609	1759	1910	2060	2211	2361	2512	2662	2813
86	2963	3114	3264	3415̄	3565	3716	3866	4017	4167	4317
87	4468	4618	4769	4919	5070	5220	5370	5521	5671	5822
88	5972	6122	6273	6423	6573	6724	6874	7024	7175̄	7325
89	7475	7626	7776	7926	8077	8227	8377	8528	8678	8828
2890	8978	9129	9279	9429	9579	9730	9880	0̄030	0̄180	0̄331
91	461 0481	0631	0781	0932	1082	1232	1382	1532	1683	1833
92	1983	2133	2283	2433	2584	2734	2884	3034	3184	3334
93	3484	3634	3785̄	3935̄	4085̄	4235̄	4385̄	4535	4685	4835
94	4985	5135	5285	5435	5585	5736	5886	6036	6186	6336
95	6486	6636	6786	6936	7086	7236	7386	7536	7686	7836
96	7986	8136	8285	8435	8585	8735	8885	9035	9185	9335
97	9485̄	9635̄	9785̄	9935̄	0̄085̄	0̄234	0̄384	0̄534	0̄684	0̄834
98	462 0984	1134	1284	1433	1583	1733	1883	2033	2183	2332
99	2482	2632	2782	2932	3081	3231	3381	3531	3680	3830
2900	3980	4130	4279	4429	4579	4729	4878	5028	5178	5328
N.	0	1	2	3	4	5	6	7	8	9

P. P.

	152
1	15.2
2	30.4
3	45.6
4	60.8
5	76.0
6	91.2
7	106.4
8	121.6
9	136.8

	151
1	15.1
2	30.2
3	45.3
4	60.4
5	75.5
6	90.6
7	105.7
8	120.8
9	135.9

	150
1	15.0
2	30.0
3	45.0
4	60.0
5	75.0
6	90.0
7	105.0
8	120.0
9	135.0

	149
1	14.9
2	29.8
3	44.7
4	59.6
5	74.5
6	89.4
7	104.3
8	119.2
9	134.1

P. P.

N.	0	1	2	3	4	5	6	7	8	9	P. P.
2900	462 3980	4130	4279	4429	4579	4729	4878	5028	5178	5328	
01	5477	5627	5777	5926	6076	6226	6375	6525	6675̅	6824	
02	6974	7124	7273	7423	7573	7722	7872	8022	8171	8321	
03	8470	8620	8770	8919	9069	9218	9368	9517	9667	9817	
04	9966	0̅116	0̅265	0̅415̅	0̅564	0̅714	0̅863	1̅013	1̅162	1̅312	
05	463 1461	1611	1760	1910	2059	2209	2358	2508	2657	2807	
06	2956	3106	3255̅	3404	3554	3703	3853	4002	4152	4301	
07	4450	4600	4749	4898	5048	5197	5347	5496	5645	5795̅	
08	5944	6093	6243	6392	6541	6691	6840	6989	7139	7288	
09	7437	7587	7736	7885	8034	8184	8333	8482	8631	8781	
2910	8930	9079	9228	9378	9527	9676	9825	9974	0̅124	0̅273	
11	464 0422	0571	0720	0870	1019	1168	1317	1466	1615	1765̅	
12	1914	2063	2212	2361	2510	2659	2808	2958	3107	3256	
13	3405̅	3554	3703	3852	4001	4150	4299	4448	4597	4746	
14	4895	5045̅	5194	5343	5492	5641	5790	5939	6088	6237	
15	6386	6535̅	6684	6833	6981	7130	7279	7428	7577	7726	
16	7875	8024	8173	8322	8471	8620	8769	8918	9067	9215	
17	9364	9513	9662	9811	9960	0̅109	0̅258	0̅406	0̅555	0̅704	
18	465 0853	1002	1151	1299	1448	1597	1746	1895̅	2043	2192	
19	2341	2490	2639	2787	2936	3085̅	3234	3382	3531	3680	
2920	3829	3977	4126	4275̅	4423	4572	4721	4870	5018	5167	
21	5316	5464	5613	5762	5910	6059	6208	6356	6505̅	6653	
22	6802	6951	7099	7248	7397	7545	7694	7842	7991	8140	
23	8288	8437	8585	8734	8882	9031	9180	9328	9477	9625	
24	9774	9922	0̅071	0̅219	0̅368	0̅516	0̅665̅	0̅813	0̅962	1̅110	
25	466 1259	1407	1556	1704	1853	2001	2149	2298	2446	2595̅	
26	2743	2892	3040	3188	3337	3485	3634	3782	3930	4079	
27	4227	4376	4524	4672	4821	4969	5117	5266	5414	5562	
28	5711	5859	6007	6156	6304	6452	6601	6749	6897	7045̅	
29	7194	7342	7490	7639	7787	7935	8083	8232	8380	8528	
2930	8676	8824	8973	9121	9269	9417	9565	9714	9862	0̅010	
31	467 0158	0306	0455̅	0603	0751	0899	1047	1195	1343	1492	
32	1640	1788	1936	2084	2232	2380	2528	2676	2824	2973	
33	3121	3269	3417	3565̅	3713	3861	4009	4157	4305	4453	
34	4601	4749	4897	5045	5193	5341	5489	5637	5785	5933	
35	6081	6229	6377	6525̅	6673	6821	6969	7117	7265̅	7413	
36	7561	7708	7856	8004	8152	8300	8448	8596	8744	8892	
37	9039	9187	9335	9483	9631	9779	9927	0̅074	0̅222	0̅370	
38	468 0518	0666	0814	0961	1109	1257	1405̅	1553	1700	1848	
39	1996	2144	2291	2439	2587	2735̅	2882	3030	3178	3326	
2940	3473	3621	3769	3916	4064	4212	4360	4507	4655̅	4803	
41	4950	5098	5246	5393	5541	5689	5836	5984	6131	6279	
42	6427	6574	6722	6870	7017	7165̅	7312	7460	7607	7755	
43	7903	8050	8198	8345	8493	8640	8788	8935	9083	9231	
44	9378	9526	9673	9821	9968	0̅116	0̅263	0̅411	0̅558	0̅706	
45	469 0853	1000	1148	1295	1443	1590	1738	1885	2033	2180	
46	2327	2475̅	2622	2770	2917	3064	3212	3359	3507	3654	
47	3801	3949	4096	4243	4391	4538	4685	4833	4980	5127	
48	5275̅	5422	5569	5717	5864	6011	6159	6306	6453	6600	
49	6748	6895̅	7042	7190	7337	7484	7631	7778	7926	8073	
2950	8220	8367	8515̅	8662	8809	8956	9103	9251	9398	9545̅	
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9	134.1

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9	133.2

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9	132.3

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2950	469 8220	8367	8515̄	8662	8809	8956	9103	9251	9398	9545̄	
51	9692	9839	9986	0̄134	0̄281	0̄428	0̄575	0̄722	0̄869	1̄016	
52	470 1164	1311	1458	1605̄	1752	1899	2046	2193	2340	2487	
53	2634	2782	2929	3076	3223	3370	3517	3664	3811	3958	
54	4105̄	4252	4399	4546	4693	4840	4987	5134	5281	5428	
55	5575̄	5722	5869	6016	6163	6310	6457	6604	6750	6897	
56	7044	7191	7338	7485	7632	7779	7926	8073	8219	8366	
57	8513	8660	8807	8954	9101	9248	9394	9541	9688	9835̄	
58	9982	0̄129	0̄275	0̄422	0̄569	0̄716	0̄863	1̄009	1̄156	1̄303	
59	471 1450	1596	1743	1890	2037	2183	2330	2477	2624	2770	
2960	2917	3064	3211	3357	3504	3651	3797	3944	4091	4237	
61	4384	4531	4677	4824	4971	5117	5264	5411	5557	5704	
62	5851	5997	6144	6290	6437	6584	6730	6877	7023	7170	
63	7317	7463	7610	7756	7903	8049	8196	8342	8489	8635	
64	8782	8929	9075	9222	9368	9515̄	9661	9808	9954	0̄101	
65	472 0247	0393	0540	0686	0833	0979	1126	1272	1419	1565	
66	1711	1858	2004	2151	2297	2444	2590	2736	2883	3029	
67	3175	3322	3468	3615̄	3761	3907	4054	4200	4346	4493	
68	4639	4785	4932	5078	5224	5371	5517	5663	5809	5956	
69	6102	6248	6395̄	6541	6687	6833	6980	7126	7272	7418	
2970	7564	7711	7857	8003	8149	8296	8442	8588	8734	8880	
71	9027	9173	9319	9465	9611	9757	9903	0̄050	0̄196	0̄342	
72	473 0488	0634	0780	0926	1073	1219	1365̄	1511	1657	1803	
73	1949	2095	2241	2387	2533	2679	2825	2972	3118	3264	
74	3410	3556	3702	3848	3994	4140	4286	4432	4578	4724	
75	4870	5016	5162	5308	5454	5600	5746	5891	6037	6183	
76	6329	6475	6621	6767	6913	7059	7205̄	7351	7497	7642	
77	7788	7934	8080	8226	8372	8518	8664	8809	8955	9101	
78	9247	9393	9539	9684	9830	9976	0̄122	0̄268	0̄413	0̄559	
79	474 0705	0851	0997	1142	1288	1434	1580	1725	1871	2017	
2980	2163	2308	2454	2600	2746	2891	3037	3183	3328	3474	
81	3620	3765	3911	4057	4202	4348	4494	4639	4785	4931	
82	5076	5222	5368	5513	5659	5805̄	5950	6096	6241	6387	
83	6533	6678	6824	6969	7115̄	7260	7406	7552	7697	7843	
84	7988	8134	8279	8425̄	8570	8716	8861	9007	9152	9298	
85	9443	9589	9734	9880	0̄025	0̄171	0̄316	0̄462	0̄607	0̄753	
86	475 0898	1043	1189	1334	1480	1625	1771	1916	2061	2207	
87	2352	2498	2643	2788	2934	3079	3225̄	3370	3515	3661	
88	3806	3951	4097	4242	4387	4533	4678	4823	4969	5114	
89	5259	5404	5550	5695	5840	5986	6131	6276	6421	6567	
2990	6712	6857	7002	7148	7293	7438	7583	7729	7874	8019	
91	8164	8309	8455̄	8600	8745̄	8890	9035	9180	9326	9471	
92	9616	9761	9906	0̄051	0̄196	0̄342	0̄487	0̄632	0̄777	0̄922	
93	476 1067	1212	1357	1502	1648	1793	1938	2083	2228	2373	
94	2518	2663	2808	2953	3098	3243	3388	3533	3678	3823	
95	3968	4113	4258	4403	4548	4693	4838	4983	5128	5273	
96	5418	5563	5708	5853	5998	6143	6288	6433	6578	6723	
97	6867	7012	7157	7302	7447	7592	7737	7882	8027	8171	
98	8316	8461	8606	8751	8896	9041	9185	9330	9475	9620	
99	9765̄	9909	0̄054	0̄199	0̄344	0̄489	0̄633	0̄778	0̄923	1̄068	
3000	477 1213	1357	1502	1647	1792	1936	2081	2226	2371	2515	
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3000	477 1213	1357	1502	1647	1792	1936	2081	2226	2371	2515	
01	2660	2805̄	2949	3094	3239	3383	3528	3673	3818	3962	
02	4107	4252	4396	4541	4686	4830	4975̄	5119	5264	5409	
03	5553	5698	5843	5987	6132	6276	6421	6566	6710	6855̄	
04	6999	7144	7288	7433	7578	7722	7867	8011	8156	8300	145 1 14.5 2 29.0 3 43.5 4 58.0 5 72.5 6 87.0 7 101.5 8 116.0 9 130.5
05	8445̄	8589	8734	8878	9023	9167	9312	9456	9601	9745	
06	9890	0̄034	0̄179	0̄323	0̄468	0̄612	0̄757	0̄901	1̄045	1̄190	
07	478 1334	1479	1623	1768	1912	2056	2201	2345	2490	2634	
08	2778	2923	3067	3211	3356	3500	3645̄	3789	3933	4078	
09	4222	4366	4511	4655̄	4799	4943	5088	5232	5376	5521	
3010	5665̄	5809	5954	6098	6242	6386	6531	6675̄	6819	6963	
11	7108	7252	7396	7540	7684	7829	7973	8117	8261	8405	
12	8550	8694	8838	8982	9126	9271	9415̄	9559	9703	9847	
13	9991	0̄135	0̄280	0̄424	0̄568	0̄712	0̄856	1̄000	1̄144	1̄288	
14	479 1432	1577	1721	1865̄	2009	2153	2297	2441	2585	2729	
15	2873	3017	3161	3305	3449	3593	3737	3881	4025	4169	
16	4313	4457	4601	4745	4889	5033	5177	5321	5465	5609	144 1 14.4 2 28.8 3 43.2 4 57.6 5 72.0 6 86.4 7 100.8 8 115.2 9 129.6
17	5753	5897	6041	6185̄	6329	6473	6617	6761	6905̄	7048	
18	7192	7336	7480	7624	7768	7912	8056	8200	8343	8487	
19	8631	8775̄	8919	9063	9207	9350	9494	9638	9782	9926	
3020	480 0069	0213	0357	0501	0645̄	0788	0932	1076	1220	1363	
21	1507	1651	1795̄	1939	2082	2226	2370	2513	2657	2801	
22	2945̄	3088	3232	3376	3519	3663	3807	3950	4094	4238	
23	4381	4525	4669	4812	4956	5100	5243	5387	5531	5674	
24	5818	5961	6105	6249	6392	6536	6679	6823	6967	7110	
25	7254	7397	7541	7684	7828	7972	8115	8259	8402	8546	
26	8689	8833	8976	9120	9263	9407	9550	9694	9837	9981	
27	481 0124	0268	0411	0555̄	0698	0842	0985̄	1128	1272	1415	143 1 14.3 2 28.6 3 42.9 4 57.2 5 71.5 6 85.8 7 100.1 8 114.4 9 128.7
28	1559	1702	1846	1989	2132	2276	2419	2563	2706	2849	
29	2993	3136	3279	3423	3566	3710	3853	3996	4140	4283	
3030	4426	4570	4713	4856	5000	5143	5286	5429	5573	5716	
31	5859	6003	6146	6289	6432	6576	6719	6862	7005	7149	
32	7292	7435	7578	7722	7865̄	8008	8151	8295̄	8438	8581	
33	8724	8867	9010	9154	9297	9440	9583	9726	9869	0̄013	
34	482 0156	0299	0442	0585	0728	0871	1015̄	1158	1301	1444	
35	1587	1730	1873	2016	2159	2302	2445	2589	2732	2875̄	
36	3018	3161	3304	3447	3590	3733	3876	4019	4162	4305̄	
37	4448	4591	4734	4877	5020	5163	5306	5449	5592	5735̄	
38	5878	6021	6164	6307	6449	6592	6735	6878	7021	7164	
39	7307	7450	7593	7736	7879	8021	8164	8307	8450	8593	142 1 14.2 2 28.4 3 42.6 4 56.8 5 71.0 6 85.2 7 99.4 8 113.6 9 127.8
3040	8736	8879	9022	9164	9307	9450	9593	9736	9879	0̄021	
41	483 0164	0307	0450	0593	0735	0878	1021	1164	1307	1449	
42	1592	1735̄	1878	2020	2163	2306	2449	2591	2734	2877	
43	3020	3162	3305̄	3448	3590	3733	3876	4018	4161	4304	
44	4446	4589	4732	4874	5017	5160	5302	5445	5588	5730	
45	5873	6016	6158	6301	6443	6586	6729	6871	7014	7156	
46	7299	7442	7584	7727	7869	8012	8154	8297	8439	8582	
47	8725̄	8867	9010	9152	9295̄	9437	9580	9722	9865̄	0̄007	
48	484 0150	0292	0435̄	0577	0720	0862	1004	1147	1289	1432	
49	1574	1717	1859	2002	2144	2286	2429	2571	2714	2856	
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3050	484 2998	3141	3283	3426	3568	3710	3853	3995	4137	4280
51	4422	4564	4707	4849	4991	5134	5276	5418	5561	5703
52	5845	5988	6130	6272	6414	6557	6699	6841	6984	7126
53	7268	7410	7553	7695̅	7837	7979	8121	8264	8406	8548
54	8690	8833	8975̅	9117	9259	9401	9543	9686	9828	9970
55	485 0112	0254	0396	0539	0681	0823	0965	1107	1249	1391
56	1533	1676	1818	1960	2102	2244	2386	2528	2670	2812
57	2954	3096	3239	3381	3523	3665̅	3807	3949	4091	4233
58	4375̅	4517	4659	4801	4943	5085̅	5227	5369	5511	5653
59	5795̅	5937	6079	6221	6363	6505̅	6647	6788	6930	7072
3060	7214	7356	7498	7640	7782	7924	8066	8208	8350	8491
61	8633	8775	8917	9059	9201	9343	9484	9626	9768	9910
62	486 0052	0194	0336	0477	0619	0761	0903	1045̅	1186	1328
63	1470	1612	1754	1895	2037	2179	2321	2462	2604	2746
64	2888	3029	3171	3313	3455̅	3596	3738	3880	4021	4163
65	4305̅	4446	4588	4730	4872	5013	5155̅	5297	5438	5580
66	5722	5863	6005̅	6146	6288	6430	6571	6713	6855̅	6996
67	7138	7279	7421	7563	7704	7846	7987	8129	8270	8412
68	8554	8695	8837	8978	9120	9261	9403	9544	9686	9827
69	9969	0̅110	0̅252	0̅393	0̅535̅	0̅676	0̅818	0̅959	1̅101	1̅242
3070	487 1384	1525	1667	1808	1950	2091	2232	2374	2515	2657
71	2798	2940	3081	3222	3364	3505	3647	3788	3929	4071
72	4212	4353	4495̅	4636	4778	4919	5060	5202	5343	5484
73	5626	5767	5908	6050	6191	6332	6473	6615̅	6756	6897
74	7039	7180	7321	7462	7604	7745̅	7886	8027	8169	8310
75	8451	8592	8734	8875̅	9016	9157	9299	9440	9581	9722
76	9863	0̅004	0̅146	0̅287	0̅428	0̅569	0̅710	0̅852	0̅993	1̅134
77	488 1275̅	1416	1557	1698	1839	1981	2122	2263	2404	2545
78	2686	2827	2968	3109	3251	3392	3533	3674	3815̅	3956
79	4097	4238	4379	4520	4661	4802	4943	5084	5225	5366
3080	5507	5648	5789	5930	6071	6212	6353	6494	6635	6776
81	6917	7058	7199	7340	7481	7622	7763	7904	8045̅	8185
82	8326	8467	8608	8749	8890	9031	9172	9313	9454	9594
83	9735	9876	0̅017	0̅158	0̅299	0̅440	0̅580	0̅721	0̅862	1̅003
84	489 1144	1285̅	1425	1566	1707	1848	1989	2129	2270	2411
85	2552	2692	2833	2974	3115̅	3256	3396	3537	3678	3818
86	3959	4100	4241	4381	4522	4663	4804	4944	5085̅	5226
87	5366	5507	5648	5788	5929	6070	6210	6351	6492	6632
88	6773	6914	7054	7195̅	7335	7476	7617	7757	7898	8038
89	8179	8320	8460	8601	8741	8882	9023	9163	9304	9444
3090	9585̅	9725	9866	0̅006	0̅147	0̅287	0̅428	0̅569	0̅709	0̅850
91	490 0990	1131	1271	1412	1552	1693	1833	1973	2114	2254
92	2395̅	2535	2676	2816	2957	3097	3238	3378	3518	3659
93	3799	3940	4080	4220	4361	4501	4642	4782	4922	5063
94	5203	5343	5484	5624	5765̅	5905̅	6045	6186	6326	6466
95	6607	6747	6887	7027	7168	7308	7448	7589	7729	7869
96	8010	8150	8290	8430	8571	8711	8851	8991	9132	9272
97	9412	9552	9693	9833	9973	0̅113	0̅253	0̅394	0̅534	0̅674
98	491 0814	0954	1094	1235̅	1375̅	1515	1655	1795	1935	2076
99	2216	2356	2496	2636	2776	2916	3057	3197	3337	3477
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P. P.

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01	5018	5158	5298	5438	5578	5718	5858	5998	6138	6278
02	6418	6558	6698	6838	6978	7118	7258	7398	7538	7678
03	7818	7958	8098	8238	8378	8517	8657	8797	8937	9077
04	9217	9357	9497	9637	9777	9917	0̄057	0̄196	0̄336	0̄476
05	492 0616	0756	0896	1036	1175	1315	1455	1595	1735̄	1875̄
06	2015̄	2154	2294	2434	2574	2714	2853	2993	3133	3273
07	3413	3552	3692	3832	3972	4111	4251	4391	4531	4670
08	4810	4950	5090	5229	5369	5509	5648	5788	5928	6068
09	6207	6347	6487	6626	6766	6906	7045	7185̄	7325̄	7464
3110	7604	7744	7883	8023	8162	8302	8442	8581	8721	8861
11	9000	9140	9279	9419	9558	9698	9838	9977	0̄117	0̄256
12	493 0396	0535	0675̄	0815̄	0954	1094	1233	1373	1512	1652
13	1791	1931	2070	2210	2349	2489	2628	2768	2907	3047
14	3186	3326	3465	3604	3744	3883	4023	4162	4302	4441
15	4581	4720	4859	4999	5138	5278	5417	5556	5696	5835
16	5974	6114	6253	6393	6532	6671	6811	6950	7089	7229
17	7368	7507	7647	7786	7925	8065̄	8204	8343	8483	8622
18	8761	8900	9040	9179	9318	9457	9597	9736	9875	0̄015̄
19	494 0154	0293	0432	0571	0711	0850	0989	1128	1268	1407
3120	1546	1685	1824	1964	2103	2242	2381	2520	2659	2799
21	2938	3077	3216	3355	3494	3633	3773	3912	4051	4190
22	4329	4468	4607	4746	4885	5024	5164	5303	5442	5581
23	5720	5859	5998	6137	6276	6415	6554	6693	6832	6971
24	7110	7249	7388	7527	7666	7805	7944	8083	8222	8361
25	8500	8639	8778	8917	9056	9195	9334	9473	9612	9751
26	9890	0̄029	0̄168	0̄307	0̄445	0̄584	0̄723	0̄862	1̄001	1̄140
27	495 1279	1418	1557	1695	1834	1973	2112	2251	2390	2529
28	2667	2806	2945	3084	3223	3362	3500	3639	3778	3917
29	4056	4194	4333	4472	4611	4750	4888	5027	5166	5305̄
3130	5443	5582	5721	5860	5998	6137	6276	6415̄	6553	6692
31	6831	6969	7108	7247	7385	7524	7663	7802	7940	8079
32	8218	8356	8495̄	8634	8772	8911	9049	9188	9327	9465
33	9604	9743	9881	0̄020	0̄158	0̄297	0̄436	0̄574	0̄713	0̄851
34	496 0990	1128	1267	1406	1544	1683	1821	1960	2098	2237
35	2375	2514	2653	2791	2930	3068	3207	3345	3484	3622
36	3761	3899	4038	4176	4314	4453	4591	4730	4868	5007
37	5145	5284	5422	5560	5699	5837	5976	6114	6253	6391
38	6529	6668	6806	6945̄	7083	7221	7360	7498	7636	7775̄
39	7913	8052	8190	8328	8467	8605̄	8743	8882	9020	9158
3140	9296	9435̄	9573	9711	9850	9988	0̄126	0̄265̄	0̄403	0̄541
41	497 0679	0818	0956	1094	1232	1371	1509	1647	1785	1924
42	2062	2200	2338	2476	2615̄	2753	2891	3029	3167	3306
43	3444	3582	3720	3858	3996	4135̄	4273	4411	4549	4687
44	4825	4964	5102	5240	5378	5516	5654	5792	5930	6068
45	6206	6345̄	6483	6621	6759	6897	7035̄	7173	7311	7449
46	7587	7725	7863	8001	8139	8277	8415	8553	8691	8829
47	8967	9105	9243	9381	9519	9657	9795	9933	0̄071	0̄209
48	498 0347	0485	0623	0761	0899	1037	1175̄	1313	1451	1589
49	1727	1865̄	2002	2140	2278	2416	2554	2692	2830	2968
3150	3106	3243	3381	3519	3657	3795̄	3933	4071	4208	4346
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P. P.

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P. P.

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3150	498 3106	3243	3381	3519	3657	3795̄	3933	4071	4208	4346
51	4484	4622	4760	4897	5035	5173	5311	5449	5587	5724
52	5862	6000	6138	6275	6413	6551	6689	6826	6964	7102
53	7240	7377	7515	7653	7791	7928	8066	8204	8341	8479
54	8617	8755̄	8892	9030	9168	9305	9443	9581	9718	9856
55	9994	0̄131	0̄269	0̄407	0̄544	0̄682	0̄819	0̄957	1̄095̄	1̄232
56	499 1370	1508	1645	1783	1920	2058	2196	2333	2471	2608
57	2746	2883	3021	3158	3296	3434	3571	3709	3846	3984
58	4121	4259	4396	4534	4671	4809	4946	5084	5221	5359
59	5496	5634	5771	5909	6046	6184	6321	6459	6596	6733
3160	6871	7008	7146	7283	7421	7558	7695	7833	7970	8108
61	8245̄	8382	8520	8657	8794	8932	9069	9207	9344	9481
62	9619	9756	9893	0̄031	0̄168	0̄305	0̄443	0̄580	0̄717	0̄855̄
63	500 0992	1129	1267	1404	1541	1678	1816	1953	2090	2227
64	2365̄	2502	2639	2777	2914	3051	3188	3325	3463	3600
65	3737	3874	4012	4149	4286	4423	4560	4698	4835̄	4972
66	5109	5246	5383	5521	5658	5795̄	5932	6069	6206	6344
67	6481	6618	6755̄	6892	7029	7166	7303	7440	7578	7715̄
68	7852	7989	8126	8263	8400	8537	8674	8811	8948	9085
69	9222	9359	9496	9634	9771	9908	0̄045̄	0̄182	0̄319	0̄456
3170	501 0593	0730	0867	1004	1141	1278	1415̄	1552	1688	1825
71	1962	2099	2236	2373	2510	2647	2784	2921	3058	3195̄
72	3332	3469	3606	3743	3879	4016	4153	4290	4427	4564
73	4701	4838	4974	5111	5248	5385	5522	5659	5796	5932
74	6069	6206	6343	6480	6617	6753	6890	7027	7164	7301
75	7437	7574	7711	7848	7984	8121	8258	8395̄	8531	8668
76	8805̄	8942	9078	9215	9352	9489	9625	9762	9899	0̄035
77	502 0172	0309	0446	0582	0719	0856	0992	1129	1266	1402
78	1539	1676	1812	1949	2086	2222	2359	2495	2632	2769
79	2905	3042	3178	3315	3452	3588	3725̄	3861	3998	4135̄
3180	4271	4408	4544	4681	4817	4954	5091	5227	5364	5500
81	5637	5773	5910	6046	6183	6319	6456	6592	6729	6865
82	7002	7138	7275̄	7411	7548	7684	7821	7957	8093	8230
83	8366	8503	8639	8776	8912	9049	9185̄	9321	9458	9594
84	9731	9867	0̄003	0̄140	0̄276	0̄413	0̄549	0̄685	0̄822	0̄958
85	503 1094	1231	1367	1503	1640	1776	1912	2049	2185	2321
86	2458	2594	2730	2867	3003	3139	3276	3412	3548	3684
87	3821	3957	4093	4229	4366	4502	4638	4774	4911	5047
88	5183	5319	5456	5592	5728	5864	6000	6137	6273	6409
89	6545	6681	6818	6954	7090	7226	7362	7498	7635̄	7771
3190	7907	8043	8179	8315	8451	8587	8724	8860	8996	9132
91	9268	9404	9540	9676	9812	9948	0̄085̄	0̄221	0̄357	0̄493
92	504 0629	0765̄	0901	1037	1173	1309	1445	1581	1717	1853
93	1989	2125	2261	2397	2533	2669	2805	2941	3077	3213
94	3349	3485	3621	3757	3893	4029	4165̄	4301	4437	4573
95	4709	4845̄	4980	5116	5252	5388	5524	5660	5796	5932
96	6068	6204	6339	6475	6611	6747	6883	7019	7155̄	7291
97	7426	7562	7698	7834	7970	8106	8241	8377	8513	8649
98	8785̄	8920	9056	9192	9328	9464	9599	9735	9871	0̄007
99	505 0142	0278	0414	0550	0685	0821	0957	1093	1228	1364
3200	1500	1635	1771	1907	2043	2178	2314	2450	2585	2721
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P. P.

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P. P.

N.	0	1	2	3	4	5	6	7	8	9
3200	505 1500	1635	1771	1907	2043	2178	2314	2450	2585	2721
01	2857	2992	3128	3264	3399	3535	3671	3806	3942	4078
02	4213	4349	4485	4620	4756	4891	5027	5163	5298	5434
03	5569	5705	5841	5976	6112	6247	6383	6518	6654	6790
04	6925	7061	7196	7332	7467	7603	7738	7874	8009	8145
05	8280	8416	8551	8687	8822	8958	9093	9229	9364	9500
06	9635	9771	9906	0̅042	0̅177	0̅312	0̅448	0̅583	0̅719	0̅854
07	506 0990	1125	1260	1396	1531	1667	1802	1937	2073	2208
08	2344	2479	2614	2750	2885	3020	3156	3291	3426	3562
09	3697	3833	3968	4103	4238	4374	4509	4644	4780	4915
3210	5050	5186	5321	5456	5591	5727	5862	5997	6133	6268
11	6403	6538	6674	6809	6944	7079	7214	7350	7485	7620
12	7755	7891	8026	8161	8296	8431	8567	8702	8837	8972
13	9107	9242	9378	9513	9648	9783	9918	0̅053	0̅188	0̅324
14	507 0459	0594	0729	0864	0999	1134	1269	1405	1540	1675
15	1810	1945	2080	2215	2350	2485	2620	2755	2890	3025
16	3160	3295	3430	3566	3701	3836	3971	4106	4241	4376
17	4511	4646	4781	4916	5051	5186	5321	5456	5590	5725
18	5860	5995	6130	6265	6400	6535	6670	6805	6940	7075
19	7210	7345	7480	7614	7749	7884	8019	8154	8289	8424
3220	8559	8694	8828	8963	9098	9233	9368	9503	9638	9772
21	9907	0̅042	0̅177	0̅312	0̅447	0̅581	0̅716	0̅851	0̅986	1̅121
22	508 1255	1390	1525	1660	1794	1929	2064	2199	2334	2468
23	2603	2738	2873	3007	3142	3277	3411	3546	3681	3816
24	3950	4085	4220	4354	4489	4624	4758	4893	5028	5163
25	5297	5432	5567	5701	5836	5970	6105	6240	6374	6509
26	6644	6778	6913	7047	7182	7317	7451	7586	7720	7855
27	7990	8124	8259	8393	8528	8663	8797	8932	9066	9201
28	9335	9470	9604	9739	9873	0̅008	0̅142	0̅277	0̅411	0̅546
29	509 0680	0815	0949	1084	1218	1353	1487	1622	1756	1891
3230	2025	2160	2294	2429	2563	2697	2832	2966	3101	3235
31	3370	3504	3638	3773	3907	4042	4176	4310	4445	4579
32	4714	4848	4982	5117	5251	5385	5520	5654	5788	5923
33	6057	6191	6326	6460	6594	6729	6863	6997	7132	7266
34	7400	7534	7669	7803	7937	8072	8206	8340	8474	8609
35	8743	8877	9011	9146	9280	9414	9548	9682	9817	9951
36	510 0085	0219	0354	0488	0622	0756	0890	1024	1159	1293
37	1427	1561	1695	1829	1964	2098	2232	2366	2500	2634
38	2768	2903	3037	3171	3305	3439	3573	3707	3841	3975
39	4109	4244	4378	4512	4646	4780	4914	5048	5182	5316
3240	5450	5584	5718	5852	5986	6120	6254	6388	6522	6656
41	6790	6924	7058	7192	7326	7460	7594	7728	7862	7996
42	8130	8264	8398	8532	8666	8800	8934	9068	9202	9336
43	9469	9603	9737	9871	0̅005	0̅139	0̅273	0̅407	0̅541	0̅675
44	511 0808	0942	1076	1210	1344	1478	1612	1745	1879	2013
45	2147	2281	2415	2548	2682	2816	2950	3084	3218	3351
46	3485	3619	3753	3887	4020	4154	4288	4422	4555	4689
47	4823	4957	5090	5224	5358	5492	5625	5759	5893	6026
48	6160	6294	6428	6561	6695	6829	6962	7096	7230	7363
49	7497	7631	7764	7898	8032	8165	8299	8433	8566	8700
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P. P.

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P. P.

3250 — 3300

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3250	511 8834	8967	9101	9234	9368	9502	9635	9769	9903	0̄036	
51	512 0170	0303	0437	0570	0704	0838	0971	1105̄	1238	1372	
52	1505	1639	1772	1906	2040	2173	2307	2440	2574	2707	
53	2841	2974	3108	3241	3375̄	3508	3642	3775	3909	4042	
54	4175	4309	4442	4576	4709	4843	4976	5110	5243	5377	
55	5510	5643	5777	5910	6044	6177	6310	6444	6577	6711	
56	6844	6977	7111	7244	7377	7511	7644	7778	7911	8044	
57	8178	8311	8444	8578	8711	8844	8978	9111	9244	9377	
58	9511	9644	9777	9911	0̄044	0̄177	0̄311	0̄444	0̄577	0̄710	
59	513 0844	0977	1110	1243	1377	1510	1643	1776	1910	2043	
3260	2176	2309	2442	2576	2709	2842	2975	3108	3242	3375̄	
61	3508	3641	3774	3908	4041	4174	4307	4440	4573	4706	
62	4840	4973	5106	5239	5372	5505	5638	5771	5905	6038	
63	6171	6304	6437	6570	6703	6836	6969	7102	7235	7368	
64	7502	7635̄	7768	7901	8034	8167	8300	8433	8566	8699	
65	8832	8965̄	9098	9231	9364	9497	9630	9763	9896	0̄029	
66	514 0162	0295̄	0428	0561	0694	0827	0960	1093	1225	1358	
67	1491	1624	1757	1890	2023	2156	2289	2422	2555̄	2688	
68	2820	2953	3086	3219	3352	3485̄	3618	3751	3883	4016	
69	4149	4282	4415̄	4548	4681	4813	4946	5079	5212	5345̄	
3270	5478	5610	5743	5876	6009	6142	6274	6407	6540	6673	
71	6805	6938	7071	7204	7336	7469	7602	7735̄	7867	8000	
72	8133	8266	8398	8531	8664	8797	8929	9062	9195̄	9327	
73	9460	9593	9725	9858	9991	0̄123	0̄256	0̄389	0̄521	0̄654	
74	515 0787	0919	1052	1185̄	1317	1450	1583	1715	1848	1980	
75	2113	2246	2378	2511	2643	2776	2909	3041	3174	3306	
76	3439	3571	3704	3837	3969	4102	4234	4367	4499	4632	
77	4764	4897	5029	5162	5294	5427	5560	5692	5825̄	5957	
78	6089	6222	6354	6487	6619	6752	6884	7017	7149	7282	
79	7414	7547	7679	7811	7944	8076	8209	8341	8474	8606	
3280	8738	8871	9003	9136	9268	9400	9533	9665	9798	9930	
81	516 0062	0195̄	0327	0459	0592	0724	0856	0989	1121	1253	
82	1386	1518	1650	1783	1915	2047	2180	2312	2444	2577	
83	2709	2841	2973	3106	3238	3370	3502	3635̄	3767	3899	
84	4031	4164	4296	4428	4560	4693	4825̄	4957	5089	5222	
85	5354	5486	5618	5750	5883	6015̄	6147	6279	6411	6543	
86	6676	6808	6940	7072	7204	7336	7469	7601	7733	7865̄	
87	7997	8129	8261	8393	8526	8658	8790	8922	9054	9186	
88	9318	9450	9582	9714	9846	9978	0̄111	0̄243	0̄375̄	0̄507	
89	517 0639	0771	0903	1035̄	1167	1299	1431	1563	1695̄	1827	
3290	1959	2091	2223	2355̄	2487	2619	2751	2883	3015̄	3147	
91	3279	3411	3543	3675̄	3807	3939	4071	4202	4334	4466	
92	4598	4730	4862	4994	5126	5258	5390	5522	5654	5785	
93	5917	6049	6181	6313	6445̄	6577	6709	6840	6972	7104	
94	7236	7368	7500	7631	7763	7895	8027	8159	8291	8422	
95	8554	8686	8818	8950	9081	9213	9345̄	9477	9608	9740	
96	9872	0̄004	0̄136	0̄267	0̄399	0̄531	0̄663	0̄794	0̄926	1̄058	
97	518 1189	1321	1453	1585̄	1716	1848	1980	2111	2243	2375̄	
98	2507	2638	2770	2902	3033	3165̄	3297	3428	3560	3692	
99	3823	3955̄	4086	4218	4350	4481	4613	4745̄	4876	5008	
3300	5139	5271	5403	5534	5666	5797	5929	6061	6192	6324	
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3300	518 5139	5271	5403	5534	5666	5797	5929	6061	6192	6324	
01	6455	6587	6718	6850	6981	7113	7245̄	7376	7508	7639	
02	7771	7902	8034	8165	8297	8428	8560	8691	8823	8954	
03	9086	9217	9349	9480	9612	9743	9875̄	0̄006	0̄137	0̄269	
04	519 0400	0532	0663	0795̄	0926	1058	1189	1320	1452	1583	132 1 13.2 2 26.4 3 39.6 4 52.8 5 66.0 6 79.2 7 92.4 8 105.6 9 118.8
05	1715̄	1846	1977	2109	2240	2372	2503	2634	2766	2897	
06	3028	3160	3291	3423	3554	3685	3817	3948	4079	4211	
07	4342	4473	4605̄	4736	4867	4999	5130	5261	5392	5524	
08	5655	5786	5918	6049	6180	6311	6443	6574	6705	6836	
09	6968	7099	7230	7361	7493	7624	7755	7886	8018	8149	
3310	8280	8411	8542	8674	8805̄	8936	9067	9198	9329	9461	
11	9592	9723	9854	9985	0̄116	0̄248	0̄379	0̄510	0̄641	0̄772	
12	520 0903	1034	1166	1297	1428	1559	1690	1821	1952	2083	
13	2214	2345	2477	2608	2739	2870	3001	3132	3263	3394	
14	3525	3656	3787	3918	4049	4180	4311	4442	4573	4704	
15	4835	4966	5097	5228	5359	5490	5621	5752	5883	6014	131 1 13.1 2 26.2 3 39.3 4 52.4 5 65.5 6 78.6 7 91.7 8 104.8 9 117.9
16	6145	6276	6407	6538	6669	6800	6931	7062	7193	7324	
17	7455̄	7586	7717	7847	7978	8109	8240	8371	8502	8633	
18	8764	8895̄	9026	9156	9287	9418	9549	9680	9811	9942	
19	521 0073	0203	0334	0465	0596	0727	0858	0988	1119	1250	
3320	1381	1512	1642	1773	1904	2035̄	2166	2296	2427	2558	
21	2689	2820	2950	3081	3212	3343	3473	3604	3735̄	3866	
22	3996	4127	4258	4388	4519	4650	4781	4911	5042	5173	
23	5303	5434	5565̄	5695	5826	5957	6088	6218	6349	6479	
24	6610	6741	6871	7002	7133	7263	7394	7525̄	7655	7786	
25	7916	8047	8178	8308	8439	8570	8700	8831	8961	9092	
26	9222	9353	9484	9614	9745̄	9875	0̄006	0̄136	0̄267	0̄397	
27	522 0528	0659	0789	0920	1050	1181	1311	1442	1572	1703	130 1 13.0 2 26.0 3 39.0 4 52.0 5 65.0 6 78.0 7 91.0 8 104.0 9 117.0
28	1833	1964	2094	2225̄	2355	2486	2616	2747	2877	3007	
29	3138	3268	3399	3529	3660	3790	3921	4051	4181	4312	
3330	4442	4573	4703	4834	4964	5094	5225̄	5355	5486	5616	
31	5746	5877	6007	6137	6268	6398	6529	6659	6789	6920	
32	7050	7180	7311	7441	7571	7702	7832	7962	8093	8223	
33	8353	8483	8614	8744	8874	9005̄	9135̄	9265	9395	9526	
34	9656	9786	9916	0̄047	0̄177	0̄307	0̄437	0̄568	0̄698	0̄828	
35	523 0958	1089	1219	1349	1479	1609	1740	1870	2000	2130	
36	2260	2391	2521	2651	2781	2911	3041	3172	3302	3432	
37	3562	3692	3822	3952	4083	4213	4343	4473	4603	4733	
38	4863	4993	5124	5254	5384	5514	5644	5774	5904	6034	
39	6164	6294	6424	6554	6684	6814	6945̄	7075̄	7205̄	7335̄	129 1 12.9 2 25.8 3 38.7 4 51.6 5 64.5 6 77.4 7 90.3 8 103.2 9 116.1
3340	7465̄	7595̄	7725̄	7855̄	7985̄	8115̄	8245̄	8375̄	8505̄	8635̄	
41	8765̄	8895̄	9025̄	9155̄	9285̄	9415̄	9545̄	9675̄	9805̄	9935̄	
42	524 0064	0194	0324	0454	0584	0714	0844	0974	1104	1234	
43	1364	1494	1624	1753	1883	2013	2143	2273	2403	2533	
44	2663	2793	2922	3052	3182	3312	3442	3572	3702	3831	
45	3961	4091	4221	4351	4481	4610	4740	4870	5000	5130	
46	5259	5389	5519	5649	5779	5908	6038	6168	6298	6427	
47	6557	6687	6817	6946	7076	7206	7336	7465	7595	7725̄	
48	7854	7984	8114	8244	8373	8503	8633	8762	8892	9022	
49	9151	9281	9411	9540	9670	9800	9929	0̄059	0̄189	0̄318	
3350	525 0448	0578	0707	0837	0967	1096	1226	1355	1485	1615̄	
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3350	525 0448	0578	0707	0837	0967	1096	1226	1355	1485	1615̅
51	1744	1874	2003	2133	2263	2392	2522	2651	2781	2911
52	3040	3170	3299	3429	3558	3688	3817	3947	4076	4206
53	4336	4465	4595̅	4724	4854	4983	5113	5242	5372	5501
54	5631	5760	5890	6019	6148	6278	6407	6537	6666	6796
55	6925	7055̅	7184	7314	7443	7572	7702	7831	7961	8090
56	8220	8349	8478	8608	8737	8867	8996	9125	9255̅	9384
57	9513	9643	9772	9902	0̅031	0̅160	0̅290	0̅419	0̅548	0̅678
58	526 0807	0936	1066	1195̅	1324	1454	1583	1712	1841	1971
59	2100	2229	2359	2488	2617	2746	2876	3005̅	3134	3264
3360	3393	3522	3651	3781	3910	4039	4168	4297	4427	4556
61	4685	4814	4944	5073	5202	5331	5460	5590	5719	5848
62	5977	6106	6235	6365̅	6494	6623	6752	6881	7010	7140
63	7269	7398	7527	7656	7785	7914	8043	8173	8302	8431
64	8560	8689	8818	8947	9076	9205	9334	9463	9593	9722
65	9851	9980	0̅109	0̅238	0̅367	0̅496	0̅625̅	0̅754	0̅883	1̅012
66	527 1141	1270	1399	1528	1657	1786	1915	2044	2173	2302
67	2431	2560	2689	2818	2947	3076	3205	3334	3463	3592
68	3721	3850	3979	4108	4237	4366	4494	4623	4752	4881
69	5010	5139	5268	5397	5526	5655̅	5783	5912	6041	6170
3370	6299	6428	6557	6686	6814	6943	7072	7201	7330	7459
71	7588	7716	7845	7974	8103	8232	8360	8489	8618	8747
72	8876	9004	9133	9262	9391	9520	9648	9777	9906	0̅035̅
73	528 0163	0292	0421	0550	0678	0807	0936	1065̅	1193	1322
74	1451	1579	1708	1837	1966	2094	2223	2352	2480	2609
75	2738	2866	2995	3124	3252	3381	3510	3638	3767	3896
76	4024	4153	4282	4410	4539	4668	4796	4925̅	5053	5182
77	5311	5439	5568	5696	5825̅	5954	6082	6211	6339	6468
78	6596	6725	6854	6982	7111	7239	7368	7496	7625̅	7753
79	7882	8010	8139	8267	8396	8525̅	8653	8782	8910	9039
3380	9167	9295	9424	9552	9681	9809	9938	0̅066	0̅195̅	0̅323
81	529 0452	0580	0709	0837	0965	1094	1222	1351	1479	1608
82	1736	1864	1993	2121	2250	2378	2506	2635̅	2763	2892
83	3020	3148	3277	3405	3533	3662	3790	3919	4047	4175
84	4304	4432	4560	4689	4817	4945	5074	5202	5330	5458
85	5587	5715	5843	5972	6100	6228	6356	6485̅	6613	6741
86	6870	6998	7126	7254	7383	7511	7639	7767	7896	8024
87	8152	8280	8408	8537	8665̅	8793	8921	9049	9178	9306
88	9434	9562	9690	9819	9947	0̅075̅	0̅203	0̅331	0̅459	0̅588
89	530 0716	0844	0972	1100	1228	1356	1485̅	1613	1741	1869
3390	1997	2125	2253	2381	2509	2637	2766	2894	3022	3150
91	3278	3406	3534	3662	3790	3918	4046	4174	4302	4430
92	4558	4686	4814	4943	5071	5199	5327	5455̅	5583	5711
93	5839	5967	6095̅	6223	6351	6479	6607	6734	6862	6990
94	7118	7246	7374	7502	7630	7758	7886	8014	8142	8270
95	8398	8526	8654	8782	8909	9037	9165	9293	9421	9549
96	9677	9805̅	9933	0̅060	0̅188	0̅316	0̅444	0̅572	0̅700	0̅828
97	531 0955	1083	1211	1339	1467	1595̅	1722	1850	1978	2106
98	2234	2362	2489	2617	2745̅	2873	3001	3128	3256	3384
99	3512	3639	3767	3895̅	4023	4150	4278	4406	4534	4661
3400	4789	4917	5045̅	5172	5300	5428	5556	5683	5811	5939
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P. P.

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5	64.5
6	77.4
7	90.3
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9	116.1

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3	38.4
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7	89.6
8	102.4
9	115.2

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7	88.9
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9	114.3

P. P.

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3400	531 4789	4917	5045̄	5172	5300	5428	5556	5683	5811	5939
01	6066	6194	6322	6449	6577	6705̄	6832	6960	7088	7215
02	7343	7471	7598	7726	7854	7981	8109	8237	8364	8492
03	8619	8747	8875̄	9002	9130	9258	9385	9513	9640	9768
04	9896	0̄023	0̄151	0̄278	0̄406	0̄533	0̄661	0̄789	0̄916	1̄044
05	532 1171	1299	1426	1554	1681	1809	1936	2064	2191	2319
06	2446	2574	2701	2829	2956	3084	3211	3339	3466	3594
07	3721	3849	3976	4104	4231	4359	4486	4614	4741	4868
08	4996	5123	5251	5378	5506	5633	5760	5888	6015	6143
09	6270	6397	6525̄	6652	6780	6907	7034	7162	7289	7416
3410	7544	7671	7799	7926	8053	8181	8308	8435	8563	8690
11	8817	8945̄	9072	9199	9326	9454	9581	9708	9836	9963
12	533 0090	0218	0345̄	0472	0599	0727	0854	0981	1108	1236
13	1363	1490	1617	1745̄	1872	1999	2126	2254	2381	2508
14	2635	2762	2890	3017	3144	3271	3398	3526	3653	3780
15	3907	4034	4161	4289	4416	4543	4670	4797	4924	5051
16	5179	5306	5433	5560	5687	5814	5941	6068	6196	6323
17	6450	6577	6704	6831	6958	7085	7212	7339	7466	7594
18	7721	7848	7975̄	8102	8229	8356	8483	8610	8737	8864
19	8991	9118	9245	9372	9499	9626	9753	9880	0̄007	0̄134
3420	534 0261	0388	0515	0642	0769	0896	1023	1150	1277	1404
21	1531	1658	1785̄	1912	2039	2165	2292	2419	2546	2673
22	2800	2927	3054	3181	3308	3435̄	3561	3688	3815	3942
23	4069	4196	4323	4450	4576	4703	4830	4957	5084	5211
24	5338	5464	5591	5718	5845̄	5972	6099	6225	6352	6479
25	6606	6733	6859	6986	7113	7240	7366	7493	7620	7747
26	7874	8000	8127	8254	8381	8507	8634	8761	8888	9014
27	9141	9268	9394	9521	9648	9775̄	9901	0̄028	0̄155̄	0̄281
28	535 0408	0535̄	0662	0788	0915̄	1042	1168	1295̄	1422	1548
29	1675̄	1802	1928	2055̄	2181	2308	2435̄	2561	2688	2815̄
3430	2941	3068	3194	3321	3448	3574	3701	3827	3954	4081
31	4207	4334	4460	4587	4713	4840	4967	5093	5220	5346
32	5473	5599	5726	5852	5979	6105	6232	6359	6485	6612
33	6738	6865̄	6991	7118	7244	7371	7497	7623	7750	7876
34	8003	8129	8256	8382	8509	8635	8762	8888	9015̄	9141
35	9267	9394	9520	9647	9773	9900	0̄026	0̄152	0̄279	0̄405
36	536 0532	0658	0784	0911	1037	1163	1290	1416	1543	1669
37	1795	1922	2048	2174	2301	2427	2553	2680	2806	2932
38	3059	3185	3311	3438	3564	3690	3817	3943	4069	4195
39	4322	4448	4574	4701	4827	4953	5079	5206	5332	5458
3440	5584	5711	5837	5963	6089	6216	6342	6468	6594	6721
41	6847	6973	7099	7225	7352	7478	7604	7730	7856	7982
42	8109	8235̄	8361	8487	8613	8739	8866	8992	9118	9244
43	9370	9496	9622	9749	9875̄	0̄001	0̄127	0̄253	0̄379	0̄505
44	537 0631	0758	0884	1010	1136	1262	1388	1514	1640	1766
45	1892	2018	2144	2270	2396	2523	2649	2775̄	2901	3027
46	3153	3279	3405̄	3531	3657	3783	3909	4035̄	4161	4287
47	4413	4539	4665̄	4791	4917	5043	5169	5295̄	5421	5547
48	5673	5799	5924	6050	6176	6302	6428	6554	6680	6806
49	6932	7058	7184	7310	7436	7561	7687	7813	7939	8065
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P. P.

	128
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8	102.4
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3	38.1
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7	88.9
8	101.6
9	114.3

	126
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7	88.2
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9	113.4

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P. P.

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51	9450	9575	9701	9827	9953	0̄079	0̄205̄	0̄330	0̄456	0̄582	
52	538 0708	0834	0959	1085	1211	1337	1463	1588	1714	1840	
53	1966	2092	2217	2343	2469	2595̄	2720	2846	2972	3098	
54	3223	3349	3475̄	3601	3726	3852	3978	4103	4229	4355̄	
55	4481	4606	4732	4858	4983	5109	5235̄	5360	5486	5612	
56	5737	5863	5989	6114	6240	6366	6491	6617	6743	6868	
57	6994	7119	7245	7371	7496	7622	7747	7873	7999	8124	
58	8250	8375	8501	8627	8752	8878	9003	9129	9255̄	9380	
59	9506	9631	9757	9882	0̄008	0̄133	0̄259	0̄384	0̄510	0̄635	
3460	539 0761	0887	1012	1138	1263	1389	1514	1640	1765	1891	
61	2016	2141	2267	2392	2518	2643	2769	2894	3020	3145	
62	3271	3396	3522	3647	3772	3898	4023	4149	4274	4400	
63	4525̄	4650	4776	4901	5027	5152	5277	5403	5528	5653	
64	5779	5904	6030	6155̄	6280	6406	6531	6656	6782	6907	
65	7032	7158	7283	7408	7534	7659	7784	7910	8035̄	8160	
66	8286	8411	8536	8661	8787	8912	9037	9163	9288	9413	
67	9538	9664	9789	9914	0̄039	0̄165̄	0̄290	0̄415	0̄540	0̄666	
68	540 0791	0916	1041	1167	1292	1417	1542	1667	1793	1918	
69	2043	2168	2293	2419	2544	2669	2794	2919	3044	3170	
3470	3295̄	3420	3545	3670	3795	3920	4046	4171	4296	4421	
71	4546	4671	4796	4921	5047	5172	5297	5422	5547	5672	
72	5797	5922	6047	6172	6297	6423	6548	6673	6798	6923	
73	7048	7173	7298	7423	7548	7673	7798	7923	8048	8173	
74	8298	8423	8548	8673	8798	8923	9048	9173	9298	9423	
75	9548	9673	9798	9923	0̄048	0̄173	0̄298	0̄423	0̄548	0̄673	
76	541 0798	0923	1048	1172	1297	1422	1547	1672	1797	1922	
77	2047	2172	2297	2422	2546	2671	2796	2921	3046	3171	
78	3296	3421	3546	3670	3795	3920	4045̄	4170	4295̄	4419	
79	4544	4669	4794	4919	5044	5168	5293	5418	5543	5668	
3480	5792	5917	6042	6167	6292	6416	6541	6666	6791	6915	
81	7040	7165̄	7290	7415̄	7539	7664	7789	7913	8038	8163	
82	8288	8412	8537	8662	8787	8911	9036	9161	9285	9410	
83	9535̄	9659	9784	9909	0̄033	0̄158	0̄283	0̄407	0̄532	0̄657	
84	542 0781	0906	1031	1155	1280	1405̄	1529	1654	1779	1903	
85	2028	2152	2277	2402	2526	2651	2775	2900	3025̄	3149	
86	3274	3398	3523	3648	3772	3897	4021	4146	4270	4395̄	
87	4519	4644	4769	4893	5018	5142	5267	5391	5516	5640	
88	5765̄	5889	6014	6138	6263	6387	6512	6636	6761	6885	
89	7010	7134	7259	7383	7508	7632	7756	7881	8005	8130	
3490	8254	8379	8503	8628	8752	8876	9001	9125	9250	9374	
91	9498	9623	9747	9872	9996	0̄120	0̄245̄	0̄369	0̄494	0̄618	
92	543 0742	0867	0991	1115	1240	1364	1488	1613	1737	1862	
93	1986	2110	2235̄	2359	2483	2607	2732	2856	2980	3105̄	
94	3229	3353	3478	3602	3726	3850	3975̄	4099	4223	4348	
95	4472	4596	4720	4845̄	4969	5093	5217	5342	5466	5590	
96	5714	5838	5963	6087	6211	6335	6460	6584	6708	6832	
97	6956	7081	7205̄	7329	7453	7577	7701	7826	7950	8074	
98	8198	8322	8446	8571	8695̄	8819	8943	9067	9191	9315	
99	9439	9564	9688	9812	9936	0̄060	0̄184	0̄308	0̄432	0̄556	
3500	544 0680	0805̄	0929	1053	1177	1301	1425̄	1549	1673	1797	
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8	100.0
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9	111.6

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01	1921	2045	2169	2293	2417	2541	2665	2789	2913	3037	
02	3161	3285	3409	3533	3657	3781	3905	4029	4153	4277	
03	4401	4525	4649	4773	4897	5021	5145	5269	5393	5517	
04	5641	5765̄	5889	6013	6137	6261	6385̄	6508	6632	6756	125 1 12.5 2 25.0 3 37.5 4 50.0 5 62.5 6 75.0 7 87.5 8 100.0 9 112.5
05	6880	7004	7128	7252	7376	7500	7624	7747	7871	7995	
06	8119	8243	8367	8491	8615̄	8738	8862	8986	9110	9234	
07	9358	9481	9605	9729	9853	9977	0̄101	0̄224	0̄348	0̄472	
08	545 0596	0720	0843	0967	1091	1215̄	1339	1462	1586	1710	
09	1834	1957	2081	2205̄	2329	2452	2576	2700	2824	2947	
3510	3071	3195̄	3319	3442	3566	3690	3813	3937	4061	4185̄	
11	4308	4432	4556	4679	4803	4927	5050	5174	5298	5421	
12	5545	5669	5792	5916	6040	6163	6287	6411	6534	6658	
13	6781	6905	7029	7152	7276	7400	7523	7647	7770	7894	
14	8018	8141	8265̄	8388	8512	8635	8759	8883	9006	9130	
15	9253	9377	9500	9624	9747	9871	9995̄	0̄118	0̄242	0̄365	124 1 12.4 2 24.8 3 37.2 4 49.6 5 62.0 6 74.4 7 86.8 8 99.2 9 111.6
16	546 0489	0612	0736	0859	0983	1106	1230	1353	1477	1600	
17	1724	1847	1971	2094	2218	2341	2465̄	2588	2711	2835̄	
18	2958	3082	3205	3329	3452	3576	3699	3822	3946	4069	
19	4193	4316	4439	4563	4686	4810	4933	5056	5180	5303	
3520	5427	5550	5673	5797	5920	6043	6167	6290	6414	6537	
21	6660	6784	6907	7030	7154	7277	7400	7524	7647	7770	
22	7894	8017	8140	8263	8387	8510	8633	8757	8880	9003	
23	9126	9250	9373	9496	9620	9743	9866	9989	0̄113	0̄236	
24	547 0359	0482	0605	0729	0852	0975	1098	1222	1345̄	1468	
25	1591	1714	1838	1961	2084	2207	2330	2454	2577	2700	
26	2823	2946	3069	3193	3316	3439	3562	3685	3808	3931	
27	4055̄	4178	4301	4424	4547	4670	4793	4916	5040	5163	123 1 12.3 2 24.6 3 36.9 4 49.2 5 61.5 6 73.8 7 86.1 8 98.4 9 110.7
28	5286	5409	5532	5655	5778	5901	6024	6147	6270	6394	
29	6517	6640	6763	6886	7009	7132	7255̄	7378	7501	7624	
3530	7747	7870	7993	8116	8239	8362	8485	8608	8731	8854	
31	8977	9100	9223	9346	9469	9592	9715	9838	9961	0̄084	
32	548 0207	0330	0453	0576	0699	0822	0945̄	1068	1191	1313	
33	1436	1559	1682	1805	1928	2051	2174	2297	2420	2543	
34	2665	2788	2911	3034	3157	3280	3403	3526	3648	3771	
35	3894	4017	4140	4263	4386	4508	4631	4754	4877	5000	
36	5123	5245	5368	5491	5614	5737	5859	5982	6105	6228	
37	6351	6473	6596	6719	6842	6964	7087	7210	7333	7456	
38	7578	7701	7824	7947	8069	8192	8315̄	8437	8560	8683	
39	8806	8928	9051	9174	9296	9419	9542	9665̄	9787	9910	122 1 12.2 2 24.4 3 36.6 4 48.8 5 61.0 6 73.2 7 85.4 8 97.6 9 109.8
3540	549 0033	0155	0278	0401	0523	0646	0769	0891	1014	1137	
41	1259	1382	1505̄	1627	1750	1872	1995	2118	2240	2363	
42	2486	2608	2731	2853	2976	3099	3221	3344	3466	3589	
43	3712	3834	3957	4079	4202	4324	4447	4569	4692	4815̄	
44	4937	5060	5182	5305̄	5427	5550	5672	5795̄	5917	6040	
45	6162	6285̄	6407	6530	6652	6775̄	6897	7020	7142	7265̄	
46	7387	7510	7632	7755̄	7877	8000	8122	8245̄	8367	8489	
47	8612	8734	8857	8979	9102	9224	9346	9469	9591	9714	
48	9836	9959	0̄081	0̄203	0̄326	0̄448	0̄570	0̄693	0̄815	0̄938	
49	550 1060	1182	1305̄	1427	1549	1672	1794	1917	2039	2161	
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3550	550 2284	2406	2528	2651	2773	2895	3017	3140	3262	3384
51	3507	3629	3751	3874	3996	4118	4240	4363	4485	4607
52	4730	4852	4974	5096	5219	5341	5463	5585	5708	5830
53	5952	6074	6197	6319	6441	6563	6685	6808	6930	7052
54	7174	7296	7419	7541	7663	7785	7907	8030	8152	8274
55	8396	8518	8640	8763	8885̄	9007	9129	9251	9373	9495
56	9618	9740	9862	9984	0̄106	0̄228	0̄350	0̄472	0̄594	0̄717
57	551 0839	0961	1083	1205̄	1327	1449	1571	1693	1815	1937
58	2059	2181	2304	2426	2548	2670	2792	2914	3036	3158
59	3280	3402	3524	3646	3768	3890	4012	4134	4256	4378
3560	4500	4622	4744	4866	4988	5110	5232	5354	5476	5598
61	5720	5842	5964	6086	6208	6329	6451	6573	6695	6817
62	6939	7061	7183	7305̄	7427	7549	7671	7793	7914	8036
63	8158	8280	8402	8524	8646	8768	8890	9011	9133	9255
64	9377	9499	9621	9743	9864	9986	0̄108	0̄230	0̄352	0̄474
65	552 0595	0717	0839	0961	1083	1204	1326	1448	1570	1692
66	1813	1935	2057	2179	2301	2422	2544	2666	2788	2909
67	3031	3153	3275̄	3396	3518	3640	3762	3883	4005	4127
68	4248	4370	4492	4614	4735	4857	4979	5100	5222	5344
69	5465	5587	5709	5831	5952	6074	6196	6317	6439	6561
3570	6682	6804	6925	7047	7169	7290	7412	7534	7655	7777
71	7899	8020	8142	8263	8385̄	8507	8628	8750	8871	8993
72	9115̄	9236	9358	9479	9601	9722	9844	9965	0̄087	0̄209
73	553 0330	0452	0573	0695̄	0816	0938	1059	1181	1302	1424
74	1545	1667	1789	1910	2032	2153	2275̄	2396	2517	2639
75	2760	2882	3003	3125̄	3246	3368	3489	3611	3732	3854
76	3975	4097	4218	4339	4461	4582	4704	4825	4947	5068
77	5189	5311	5432	5554	5675	5796	5918	6039	6161	6282
78	6403	6525̄	6646	6767	6889	7010	7132	7253	7374	7496
79	7617	7738	7860	7981	8102	8224	8345̄	8466	8588	8709
3580	8830	8952	9073	9194	9315	9437	9558	9679	9801	9922
81	554 0043	0164	0286	0407	0528	0650	0771	0892	1013	1135̄
82	1256	1377	1498	1620	1741	1862	1983	2104	2226	2347
83	2468	2589	2710	2832	2953	3074	3195	3316	3438	3559
84	3680	3801	3922	4044	4165̄	4286	4407	4528	4649	4770
85	4892	5013	5134	5255	5376	5497	5618	5740	5861	5982
86	6103	6224	6345	6466	6587	6708	6829	6951	7072	7193
87	7314	7435̄	7556	7677	7798	7919	8040	8161	8282	8403
88	8524	8645	8766	8887	9008	9130	9251	9372	9493	9614
89	9735̄	9856	9977	0̄098	0̄219	0̄340	0̄461	0̄582	0̄703	0̄824
3590	555 0944	1065	1186	1307	1428	1549	1670	1791	1912	2033
91	2154	2275̄	2396	2517	2638	2759	2880	3001	3121	3242
92	3363	3484	3605	3726	3847	3968	4089	4210	4330	4451
93	4572	4693	4814	4935̄	5056	5176	5297	5418	5539	5660
94	5781	5902	6022	6143	6264	6385̄	6506	6627	6747	6868
95	6989	7110	7231	7351	7472	7593	7714	7835̄	7955	8076
96	8197	8318	8438	8559	8680	8801	8921	9042	9163	9284
97	9404	9525	9646	9767	9887	0̄008	0̄129	0̄249	0̄370	0̄491
98	556 0612	0732	0853	0974	1094	1215	1336	1456	1577	1698
99	1818	1939	2060	2180	2301	2422	2542	2663	2784	2904
3600	3025	3146	3266	3387	3508	3628	3749	3869	3990	4111
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	123
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6	73.2
7	85.4
8	97.6
9	109.8

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5	60.5
6	72.6
7	84.7
8	96.8
9	108.9

	120
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6	72.0
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8	96.0
9	108.0

P. P.

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3600	556 3025	3146	3266	3387	3508	3628	3749	3869	3990	4111	
01	4231	4352	4472	4593	4714	4834	495̄5	5075	5196	5317	
02	5437	5558	5678	5799	5919	6040	6160	6281	6402	6522	
03	6643	6763	6884	7004	712̄5	7245	7366	7486	7607	7727	
04	7848	7968	8089	8209	8330	8450	8571	8691	8812	8932	
05	9053	9173	9294	9414	953̄5	965̄5	9775	9896	0̄016	0̄137	
06	557 0257	0378	0498	0619	0739	0859	0980	1100	1221	1341	
07	1461	1582	1702	1823	1943	2063	2184	2304	242̄5	254̄5	121 1 12.1 2 24.2 3 36.3 4 48.4 5 60.5 6 72.6 7 84.7 8 96.8 9 108.9
08	2665	2786	2906	3026	3147	3267	3387	3508	3628	3748	
09	3869	3989	4109	4230	4350	4470	4591	4711	4831	4952	
3610	5072	5192	5313	5433	5553	5673	5794	5914	6034	615̄5	
11	627̄5	6395	6515	6636	6756	6876	6996	7117	7237	7357	
12	7477	7598	7718	7838	7958	8079	8199	8319	8439	8559	
13	8680	8800	8920	9040	9160	9281	9401	9521	9641	9761	
14	9881	0002	0̄122	0̄242	0̄362	0̄482	0̄602	0̄723	0̄843	0̄963	
15	558 1083	1203	1323	1443	1564	1684	1804	1924	2044	2164	
16	2284	2404	2524	264̄5	276̄5	288̄5	300̄5	312̄5	324̄5	3365	
17	3485	3605	3725	3845	3965	4085	4205	4325	4446	4566	
18	4686	4806	4926	5046	5166	5286	5406	5526	5646	5766	
19	5886	6006	6126	6246	6366	6486	6606	6726	6846	6966	
3620	7086	7206	7326	7446	7566	7686	7805	7925	8045	8165	
21	8285	8405	8525	8645	876̄5	888̄5	900̄5	912̄5	924̄5	936̄5	120 1 12.0 2 24.0 3 36.0 4 48.0 5 60.0 6 72.0 7 84.0 8 96.0 9 108.0
22	9484	9604	9724	9844	9964	0̄084	0̄204	0̄324	0̄444	0̄563	
23	559 0683	0803	0923	1043	1163	1283	1403	1522	1642	1762	
24	1882	2002	2122	2241	2361	2481	2601	2721	2840	2960	
25	3080	3200	3320	3440	3559	3679	3799	3919	4038	4158	
26	4278	4398	4518	4637	4757	4877	4997	5116	5236	5356	
27	5476	5595	5715	583̄5	5954	6074	6194	6314	6433	6553	
28	6673	6792	6912	7032	7152	7271	7391	7511	7630	7750	
29	7870	7989	8109	8229	8348	8468	8588	8707	8827	8947	
3630	9066	9186	9306	9425	954̄5	9664	9784	9904	0̄023	0̄143	
31	560 0262	0382	0502	0621	0741	0860	0980	1100	1219	1339	
32	1458	1578	1698	1817	1937	2056	2176	2295	241̄5	2534	
33	2654	2774	2893	3013	3132	3252	3371	3491	3610	3730	
34	3849	3969	4088	4208	4327	4447	4566	4686	4805	492̄5	
35	5044	5164	5283	5403	5522	5641	5761	5880	6000	6119	
36	6239	6358	6478	6597	6716	6836	6955	707̄5	7194	7314	119 1 11.9 2 23.8 3 35.7 4 47.6 5 59.5 6 71.4 7 83.3 8 95.2 9 107.1
37	7433	7552	7672	7791	7911	8030	8149	8269	8388	8508	
38	8627	8746	8866	8985	9104	9224	9343	9463	9582	9701	
39	9821	9940	0̄059	0̄179	0̄298	0̄417	0̄537	0̄656	0̄775	0̄89̄5	
3640	561 1014	1133	1252	1372	1491	1610	1730	1849	1968	2088	
41	2207	2326	2445	256̄5	2684	2803	2922	3042	3161	3280	
42	3399	3519	3638	3757	3876	3996	411̄5	4234	4353	4472	
43	4592	4711	4830	4949	5069	5188	5307	5426	5545	566̄5	
44	5784	5903	6022	6141	6260	6380	6499	6618	6737	6856	
45	6975	7094	7214	7333	7452	7571	7690	7809	7928	8048	
46	8167	8286	840̄5	8524	8643	8762	8881	9000	9119	9239	
47	9358	9477	9596	971̄5	9834	9953	0̄072	0̄191	0̄310	0̄429	
48	562 0548	0667	0786	0905	1024	1144	1263	1382	1501	1620	
49	1739	1858	1977	2096	221̄5	2334	2453	2572	2691	2810	
3650	2929	3048	3167	3286	340̄5	3524	3642	3761	3880	3999	
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3650	562 2929	3048	3167	3286	3405̄	3524	3642	3761	3880	3999
51	4118	4237	4356	4475	4594	4713	4832	4951	5070	5189
52	5308	5427	5546	5664	5783	5902	6021	6140	6259	6378
53	6497	6616	6734	6853	6972	7091	7210	7329	7448	7567
54	7685	7804	7923	8042	8161	8280	8398	8517	8636	8755̄
55	8874	8993	9111	9230	9349	9468	9587	9705	9824	9943
56	563 0062	0181	0299	0418	0537	0656	0775̄	0893	1012	1131
57	1250	1368	1487	1606	1725̄	1843	1962	2081	2200	2318
58	2437	2556	2674	2793	2912	3031	3149	3268	3387	3505
59	3624	3743	3861	3980	4099	4218	4336	4455̄	4574	4692
3660	4811	4930	5048	5167	5285	5404	5523	5641	5760	5879
61	5997	6116	6235̄	6353	6472	6590	6709	6828	6946	7065̄
62	7183	7302	7421	7539	7658	7776	7895̄	8013	8132	8251
63	8369	8488	8606	8725̄	8843	8962	9081	9199	9318	9436
64	9555̄	9673	9792	9910	0̄029	0̄147	0̄266	0̄384	0̄503	0̄621
65	564 0740	0858	0977	1095	1214	1332	1451	1569	1688	1806
66	1925̄	2043	2162	2280	2398	2517	2635	2754	2872	2991
67	3109	3228	3346	3464	3583	3701	3820	3938	4056	4175̄
68	4293	4412	4530	4648	4767	4885	5004	5122	5240	5359
69	5477	5595	5714	5832	5951	6069	6187	6306	6424	6542
3670	6661	6779	6897	7016	7134	7252	7371	7489	7607	7726
71	7844	7962	8080	8199	8317	8435	8554	8672	8790	8908
72	9027	9145̄	9263	9382	9500	9618	9736	9855̄	9973	0̄091
73	565 0209	0328	0446	0564	0682	0800	0919	1037	1155	1273
74	1392	1510	1628	1746	1864	1983	2101	2219	2337	2455
75	2573	2692	2810	2928	3046	3164	3282	3401	3519	3637
76	3755	3873	3991	4109	4228	4346	4464	4582	4700	4818
77	4936	5054	5173	5291	5409	5527	5645̄	5763	5881	5999
78	6117	6235	6353	6471	6590	6708	6826	6944	7062	7180
79	7298	7416	7534	7652	7770	7888	8006	8124	8242	8360
3680	8478	8596	8714	8832	8950	9068	9186	9304	9422	9540
81	9658	9776	9894	0̄012	0̄130	0̄248	0̄366	0̄484	0̄602	0̄720
82	566 0838	0956	1074	1192	1310	1428	1545	1663	1781	1899
83	2017	2135	2253	2371	2489	2607	2725̄	2843	2960	3078
84	3196	3314	3432	3550	3668	3786	3903	4021	4139	4257
85	4375̄	4493	4611	4728	4846	4964	5082	5200	5318	5435
86	5553	5671	5789	5907	6025̄	6142	6260	6378	6496	6614
87	6731	6849	6967	7085̄	7203	7320	7438	7556	7674	7791
88	7909	8027	8145̄	8262	8380	8408	8616	8733	8851	8969
89	9087	9204	9322	9440	9557	9675	9793	9911	0̄028	0̄146
3690	567 0264	0381	0499	0617	0734	0852	0970	1087	1205	1323
91	1440	1558	1676	1793	1911	2029	2146	2264	2382	2499
92	2617	2735̄	2852	2970	3087	3205	3323	3440	3558	3675
93	3793	3911	4028	4146	4263	4381	4499	4616	4734	4851
94	4969	5086	5204	5322	5439	5557	5674	5792	5909	6027
95	6144	6262	6379	6497	6615̄	6732	6850	6967	7085̄	7202
96	7320	7437	7555̄	7672	7790	7907	8025̄	8142	8260	8377
97	8495̄	8612	8729	8847	8964	9082	9199	9317	9434	9552
98	9669	9787	9904	0̄021	0̄139	0̄256	0̄374	0̄491	0̄608	0̄726
99	568 0843	0961	1078	1196	1313	1430	1548	1665	1782	1900
3700	2017	2135̄	2252	2369	2487	2604	2721	2839	2956	3074
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P. P.

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6	71.4
7	83.3
8	95.2
9	107.1

	118
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2	23.6
3	35.4
4	47.2
5	59.0
6	70.8
7	82.6
8	94.4
9	106.2

	117
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2	23.4
3	35.1
4	46.8
5	58.5
6	70.2
7	81.9
8	93.6
9	105.3

P. P.

N.	0	1	2	3	4	5	6	7	8	9	P. P.
3700	568 2017	2135̄	2252	2369	2487	2604	2721	2839	2956	3074	
01	3191	3308	3426	3543	3660	3778	3895̄	4012	4130	4247	
02	4364	4481	4599	4716	4833	4951	5068	5185	5303	5420	
03	5537	5654	5772	5889	6006	6123	6241	6358	6475	6593	
04	6710	6827	6944	7062	7179	7296	7413	7530	7648	7765̄	
05	7882	7999	8117	8234	8351	8468	8585	8703	8820	8937	
06	9054	9171	9289	9406	9523	9640	9757	9874	9992	0̄109	
07	569 0226	0343	0460	0577	0694	0812	0929	1046	1163	1280	118 1 11.8 2 23.6 3 35.4 4 47.2 5 59.0 6 70.8 7 82.6 8 94.4 9 106.2
08	1397	1514	1631	1749	1866	1983	2100	2217	2334	2451	
09	2568	2685	2803	2920	3037	3154	3271	3388	3505̄	3622	
3710	3739	3856	3973	4090	4207	4324	4441	4558	4675	4793	
11	4910	5027	5144	5261	5378	5495̄	5612	5729	5846	5963	
12	6080	6197	6314	6431	6548	6665̄	6782	6899	7016	7133	
13	7249	7366	7483	7600	7717	7834	7951	8068	8185	8302	
14	8419	8536	8653	8770	8887	9004	9121	9237	9354	9471	
15	9588	9705	9822	9939	0̄056	0̄173	0̄290	0̄406	0̄523	0̄640	
16	570 0757	0874	0991	1108	1225̄	1341	1458	1575	1692	1809	
17	1926	2042	2159	2276	2393	2510	2627	2743	2860	2977	
18	3094	3211	3327	3444	3561	3678	3795̄	3911	4028	4145	
19	4262	4379	4495	4612	4729	4846	4962	5079	5196	5313	
3720	5429	5546	5663	5780	5896	6013	6130	6247	6363	6480	
21	6597	6713	6830	6947	7064	7180	7297	7414	7530	7647	117 1 11.7 2 23.4 3 35.1 4 46.8 5 58.5 6 70.2 7 81.9 8 93.6 9 105.3
22	7764	7880	7997	8114	8230	8347	8464	8580	8697	8814	
23	8930	9047	9164	9280	9397	9514	9630	9747	9863	9980	
24	571 0097	0213	0330	0447	0563	0680	0796	0913	1030	1146	
25	1263	1379	1496	1613	1729	1846	1962	2079	2195	2312	
26	2429	2545	2662	2778	2895̄	3011	3128	3244	3361	3477	
27	3594	3710	3827	3943	4060	4177	4293	4410	4526	4643	
28	4759	4876	4992	5109	5225̄	5341	5458	5574	5691	5807	
29	5924	6040	6157	6273	6390	6506	6623	6739	6855	6972	
3730	7088	7205̄	7321	7438	7554	7670	7787	7903	8020	8136	
31	8252	8369	8485	8602	8718	8834	8951	9067	9184	9300	
32	9416	9533	9649	9765	9882	9998	0̄115̄	0̄231	0̄347	0̄464	
33	572 0580	0696	0813	0929	1045	1162	1278	1394	1511	1627	
34	1743	1859	1976	2092	2208	2325̄	2441	2557	2674	2790	
35	2906	3022	3139	3255̄	3371	3487	3604	3720	3836	3952	
36	4069	4185̄	4301	4417	4534	4650	4766	4882	4999	5115̄	116 1 11.6 2 23.2 3 34.8 4 46.4 5 58.0 6 69.6 7 81.2 8 92.8 9 104.4
37	5231	5347	5463	5580	5696	5812	5928	6044	6161	6277	
38	6393	6509	6625	6742	6858	6974	7090	7206	7322	7438	
39	7555̄	7671	7787	7903	8019	8135	8252	8368	8484	8600	
3740	8716	8832	8948	9064	9180	9297	9413	9529	9645̄	9761	
41	9877	9993	0̄109	0̄225	0̄341	0̄457	0̄574	0̄690	0̄806	0̄922	
42	573 1038	1154	1270	1386	1502	1618	1734	1850	1966	2082	
43	2198	2314	2430	2546	2662	2778	2894	3010	3126	3242	
44	3358	3474	3590	3706	3822	3938	4054	4170	4286	4402	
45	4518	4634	4750	4866	4982	5098	5214	5330	5446	5562	
46	5678	5794	5910	6026	6141	6257	6373	6489	6605	6721	
47	6837	6953	7069	7185̄	7301	7416	7532	7648	7764	7880	
48	7996	8112	8228	8343	8459	8575	8691	8807	8923	9039	
49	9154	9270	9386	9502	9618	9734	9849	9965	0̄081	0̄197	
3750	574 0313	0428	0544	0660	0776	0892	1007	1123	1239	1355̄	
N.	0	1	2	3	4	5	6	7	8	9	P. P.

N.	0	1	2	3	4	5	6	7	8	9
3750	574 0313	0428	0544	0660	0776	0892	1007	1123	1239	135̄
51	1471	1586	1702	1818	1934	2050	2165	2281	2397	2513
52	2628	2744	2860	2976	3091	3207	3323	3438	3554	3670
53	3786	3901	4017	4133	4248	4364	4480	4596	4711	4827
54	4943	5058	5174	5290	5405	5521	5637	5752	5868	5984
55	6099	6215	6331	6446	6562	6678	6793	6909	7025̄	7140
56	7256	7371	7487	7603	7718	7834	7950	8065	8181	8296
57	8412	8528	8643	8759	8874	8990	9105	9221	9337	9452
58	9568	9683	9799	9914	0̄030	0̄146	0̄261	0̄377	0̄492	0̄608
59	575 0723	0839	0954	1070	1185	1301	1416	1532	1647	1763
3760	1878	1994	2109	2225̄	2340	2456	2571	2687	2802	2918
61	3033	3149	3264	3380	3495	3611	3726	3842	3957	4072
62	4188	4303	4419	4534	4650	4765	4881	4996	5111	5227
63	5342	5458	5573	5688	5804	5919	6035̄	6150	6265	6381
64	6496	6612	6727	6842	6958	7073	7188	7304	7419	7534
65	7650	7765	7881	7996	8111	8227	8342	8457	8573	8688
66	8803	8918	9034	9149	9264	9380	9495	9610	9726	9841
67	9956	0̄071	0̄187	0̄302	0̄417	0̄533	0̄648	0̄763	0̄878	0̄994
68	576 1109	1224	1339	1455̄	1570	1685	1800	1916	2031	2146
69	2261	2377	2492	2607	2722	2837	2953	3068	3183	3298
3770	3414	3529	3644	3759	3874	3989	4105̄	4220	4335̄	4450
71	4565	4680	4796	4911	5026	5141	5256	5371	5487	5602
72	5717	5832	5947	6062	6177	6292	6408	6523	6638	6753
73	6868	6983	7098	7213	7328	7444	7559	7674	7789	7904
74	8019	8134	8249	8364	8479	8594	8709	8824	8939	9055̄
75	9170	9285̄	9400	9515̄	9630	9745̄	9860	9975̄	0̄090	0̄205̄
76	577 0320	0435̄	0550	0665̄	0780	0895̄	1010	1125̄	1240	1355̄
77	1470	1585̄	1700	1815̄	1930	2045̄	2160	2275̄	2390	2505̄
78	2620	2734	2849	2964	3079	3194	3309	3424	3539	3654
79	3769	3884	3999	4114	4229	4343	4458	4573	4688	4803
3780	4918	5033	5148	5263	5378	5492	5607	5722	5837	5952
81	6067	6182	6296	6411	6526	6641	6756	6871	6986	7100
82	7215	7330	7445̄	7560	7675̄	7789	7904	8019	8134	8249
83	8363	8478	8593	8708	8823	8937	9052	9167	9282	9397
84	9511	9626	9741	9856	9970	0̄085	0̄200	0̄315̄	0̄429	0̄544
85	578 0659	0774	0888	1003	1118	1233	1347	1462	1577	1691
86	1806	1921	2036	2150	2265̄	2380	2494	2609	2724	2838
87	2953	3068	3182	3297	3412	3526	3641	3756	3870	3985
88	4100	4214	4329	4444	4558	4673	4788	4902	5017	5131
89	5246	5361	5475	5590	5705̄	5819	5934	6048	6163	6278
3790	6392	6507	6621	6736	6850	6965	7080	7194	7309	7423
91	7538	7652	7767	7882	7996	8111	8225	8340	8454	8569
92	8683	8798	8912	9027	9141	9256	9370	9485̄	9599	9714
93	9828	9943	0̄057	0̄172	0̄286	0̄401	0̄515	0̄630	0̄744	0̄859
94	579 0973	1088	1202	1317	1431	1546	1660	1774	1889	2003
95	2118	2232	2347	2461	2576	2690	2804	2919	3033	3148
96	3262	3376	3491	3605	3720	3834	3948	4063	4177	4292
97	4406	4520	4635̄	4749	4863	4978	5092	5207	5321	5435
98	5550	5664	5778	5893	6007	6121	6236	6350	6464	6579
99	6693	6807	6922	7036	7150	7264	7379	7493	7607	7722
3800	7836	7950	8065̄	8179	8293	8407	8522	8636	8750	8864
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P. P.

	116
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7	81.2
8	92.8
9	104.4

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3	34.5
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6	69.0
7	80.5
8	92.0
9	103.5

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9	102.6

P. P.

N.	0	1	2	3	4	5	6	7	8	9
3800	579 7836	7950	8065̄	8179	8293	8407	8522	8636	8750	8864
01	8979	9093	9207	9321	9436	9550	9664	9778	9893	0̄007
02	580 0121	0235	0350	0464	0578	0692	0806	0921	1035̄	1149
03	1263	1377	1492	1606	1720	1834	1948	2063	2177	2291
04	2405	2519	2633	2748	2862	2976	3090	3204	3318	3432
05	3547	3661	3775̄	3889	4003	4117	4231	4346	4460	4574
06	4688	4802	4916	5030	5144	5258	5372	5487	5601	5715̄
07	5829	5943	6057	6171	6285	6399	6513	6627	6741	6855
08	6969	7083	7197	7312	7426	7540	7654	7768	7882	7996
09	8110	8224	8338	8452	8566	8680	8794	8908	9022	9136
3810	9250	9364	9478	9592	9706	9820	9934	0̄048	0̄162	0̄276
11	581 0389	0503	0617	0731	0845	0959	1073	1187	1301	1415
12	1529	1643	1757	1871	1985̄	2099	2212	2326	2440	2554
13	2668	2782	2896	3010	3124	3238	3351	3465	3579	3693
14	3807	3921	4035̄	4148	4262	4376	4490	4604	4718	4832
15	4945	5059	5173	5287	5401	5515̄	5628	5742	5856	5970
16	6084	6197	6311	6425	6539	6653	6766	6880	6994	7108
17	7222	7335	7449	7563	7677	7790	7904	8018	8132	8245
18	8359	8473	8587	8700	8814	8928	9042	9155	9269	9383
19	9497	9610	9724	9838	9951	0̄065	0̄179	0̄293	0̄406	0̄520
3820	582 0634	0747	0861	0975̄	1088	1202	1316	1429	1543	1657
21	1770	1884	1998	2111	2225̄	2339	2452	2566	2680	2793
22	2907	3020	3134	3248	3361	3475̄	3589	3702	3816	3929
23	4043	4157	4270	4384	4497	4611	4725̄	4838	4952	5065
24	5179	5292	5406	5520	5633	5747	5860	5974	6087	6201
25	6314	6428	6541	6655	6769	6882	6996	7109	7223	7336
26	7450	7563	7677	7790	7904	8017	8131	8244	8358	8471
27	8585̄	8698	8812	8925	9039	9152	9265	9379	9492	9606
28	9719	9833	9946	0̄060	0̄173	0̄287	0̄400	0̄513	0̄627	0̄740
29	583 0854	0967	1081	1194	1307	1421	1534	1648	1761	1874
3830	1988	2101	2215̄	2328	2441	2555̄	2668	2781	2895̄	3008
31	3122	3235̄	3348	3462	3575̄	3688	3802	3915̄	4028	4142
32	4255	4368	4482	4595̄	4708	4822	4935̄	5048	5162	5275̄
33	5388	5501	5615̄	5728	5841	5955̄	6068	6181	6295̄	6408
34	6521	6634	6748	6861	6974	7087	7201	7314	7427	7540
35	7654	7767	7880	7993	8107	8220	8333	8446	8560	8673
36	8786	8899	9012	9126	9239	9352	9465	9578	9692	9805̄
37	9918	0̄031	0̄144	0̄258	0̄371	0̄484	0̄597	0̄710	0̄823	0̄937
38	584 1050	1163	1276	1389	1502	1615	1729	1842	1955̄	2068
39	2181	2294	2407	2520	2634	2747	2860	2973	3086	3199
3840	3312	3425	3538	3652	3765̄	3878	3991	4104	4217	4330
41	4443	4556	4669	4782	4895	5008	5121	5234	5348	5461
42	5574	5687	5800	5913	6026	6139	6252	6365̄	6478	6591
43	6704	6817	6930	7043	7156	7269	7382	7495̄	7608	7721
44	7834	7947	8060	8173	8286	8399	8512	8625̄	8738	8850
45	8963	9076	9189	9302	9415	9528	9641	9754	9867	9980
46	585 0093	0206	0319	0432	0544	0657	0770	0883	0996	1109
47	1222	1335̄	1448	1561	1673	1786	1899	2012	2125̄	2238
48	2351	2463	2576	2689	2802	2915̄	3028	3141	3253	3366
49	3479	3592	3705̄	3818	3930	4043	4156	4269	4382	4494
3850	4607	4720	4833	4946	5058	5171	5284	5397	5510	5622
N.	0	1	2	3	4	5	6	7	8	9

P. P.

	115
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3	34.5
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7	80.5
8	92.0
9	103.5

	114
1	11.4
2	22.8
3	34.2
4	45.6
5	57.0
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7	79.8
8	91.2
9	102.6

	113
1	11.3
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5	56.5
6	67.8
7	79.1
8	90.4
9	101.7

P. P.

N.	0	1	2	3	4	5	6	7	8	9
3850	585 1607	4720	4833	4946	5058	5171	5284	5397	5510	5622
51	5735	5848	5961	6073	6186	6299	6412	652̄5	6637	6750
52	6863	6976	7088	7201	7314	7426	7539	7652	776̄5	7877
53	7990	8103	8216	8328	8441	8554	8666	8779	8892	9004
54	9117	9230	9342	9455	9568	9681	9793	9906	0̄019	0̄131
55	586 0244	0356	0469	0582	0694	0807	0920	1032	114̄5	1258
56	1370	1483	1596	1708	1821	1933	2046	2159	2271	2384
57	2496	2609	2722	2834	2947	3059	3172	328̄5	3397	3510
58	3622	373̄5	3847	3960	4072	4185	4298	4410	4523	4635
59	4748	4860	4973	5085	5198	5310	5423	5535	5648	5761
3860	5873	5986	6098	6211	6323	6436	6548	6661	6773	6886
61	6998	7110	7223	7335	7448	7560	7673	7785	7898	8010
62	8123	8235	8348	8460	8572	868̄5	8797	8910	9022	913̄5
63	9247	9360	9472	9584	9697	9809	9922	0̄034	0̄146	0̄259
64	587 0371	0484	0596	0708	0821	0933	1045	1158	1270	1383
65	149̄5	1607	1720	1832	1944	2057	2169	2281	2394	2506
66	2618	2731	2843	2955	3068	3180	3292	340̄5	3517	3629
67	3742	3854	3966	4079	4191	4303	4416	4528	4640	4752
68	486̄5	4977	5089	5201	5314	5426	5538	5651	5763	5875
69	5987	6100	6212	6324	6436	6549	6661	6773	6885	6997
3870	7110	7222	7334	7446	7559	7671	7783	7895	8007	8120
71	8232	8344	8456	8568	8680	8793	890̄5	9017	9129	9241
72	9353	9466	9578	9690	9802	9914	0̄026	0̄139	0̄251	0̄363
73	588 047̄5	0587	0699	0811	0923	1036	1148	1260	1372	1484
74	1596	1708	1820	1932	204̄5	2157	2269	2381	2493	260̄5
75	2717	2829	2941	3053	3165	3277	3389	3502	3614	3726
76	3838	3950	4062	4174	4286	4398	4510	4622	4734	4846
77	4958	5070	5182	5294	5406	5518	5630	5742	5854	5966
78	6078	6190	6302	6414	6526	6638	6750	6862	6974	7086
79	7198	7310	7422	7534	7646	7758	7870	7981	8093	8205
3880	8317	8429	8541	8653	876̄5	8877	8989	9101	9213	932̄5
81	9436	9548	9660	9772	9884	9996	0̄108	0̄220	0̄332	0̄443
82	589 0555	0667	0779	0891	1003	111̄5	1227	1338	1450	1562
83	1674	1786	1898	2009	2121	2233	234̄5	2457	2569	2680
84	2792	2904	3016	3128	3239	3351	3463	357̄5	3687	3798
85	3910	4022	4134	4246	4357	4469	4581	4693	4804	4916
86	5028	5140	5251	5363	547̄5	5587	5698	5810	5922	6034
87	6145	6257	6369	6481	6592	6704	6816	6927	7039	7151
88	7263	7374	7486	7598	7709	7821	7933	8044	8156	8268
89	8379	8491	8603	8714	8826	8938	9049	9161	9273	9384
3890	9496	9608	9719	9831	9943	0̄054	0̄166	0̄277	0̄389	0̄501
91	590 0612	0724	0836	0947	1059	1170	1282	1394	1505	1617
92	1728	1840	1951	2063	217̄5	2286	2398	2509	2621	2732
93	2844	2956	3067	3179	3290	3402	3513	362̄5	3736	3848
94	3959	4071	4183	4294	4406	4517	4629	4740	4852	4963
95	507̄5	5186	5298	5409	5521	5632	5744	5855	5967	6078
96	6189	6301	6412	6524	6635	6747	6858	6970	7081	7193
97	7304	7415	7527	7638	7750	7861	7973	8084	8196	8307
98	8418	8530	8641	8753	8864	8975	9087	9198	9310	9421
99	9532	9644	9755	9866	9978	0̄089	0̄201	0̄312	0̄423	0̄53̄5
3900	591 0646	0757	0869	0980	1091	1203	1314	1426	1537	1648
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P. P.

	113
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6	67.8
7	79.1
8	90.4
9	101.7

	112
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2	22.4
3	33.6
4	44.8
5	56.0
6	67.2
7	78.4
8	89.6
9	100.8

	111
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3	33.3
4	44.4
5	55.5
6	66.6
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8	88.8
9	99.9

P. P.

3900 — 3950

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01	1760	1871	1982	2093	2205̄	2316	2427	2539	2650	2761
02	2873	2984	3095	3207	3318	3429	3540	3652	3763	3874
03	3986	4097	4208	4319	4431	4542	4653	4764	4876	4987
04	5098	5209	5321	5432	5543	5654	5765	5877	5988	6099
05	6210	6322	6433	6544	6655	6766	6878	6989	7100	7211
06	7322	7434	7545̄	7656	7767	7878	7989	8101	8212	8323
07	8434	8545	8656	8768	8879	8990	9101	9212	9323	9434
08	9546	9657	9768	9879	9990	0̄101	0̄212	0̄323	0̄434	0̄546
09	592 0657	0768	0879	0990	1101	1212	1323	1434	1545	1656
3910	1768	1879	1990	2101	2212	2323	2434	2545	2656	2767
11	2878	2989	3100	3211	3322	3433	3544	3655	3766	3877
12	3988	4099	4210	4321	4433	4544	4655̄	4766	4876	4987
13	5098	5209	5320	5431	5542	5653	5764	5875	5986	6097
14	6208	6319	6430	6541	6652	6763	6874	6985̄	7096	7207
15	7318	7429	7540	7650	7761	7872	7983	8094	8205	8316
16	8427	8538	8649	8760	8870	8981	9092	9203	9314	9425̄
17	9536	9647	9757	9868	9979	0̄090	0̄201	0̄312	0̄423	0̄533
18	593 0644	0755	0866	0977	1088	1199	1309	1420	1531	1642
19	1753	1863	1974	2085	2196	2307	2417	2528	2639	2750
3920	2861	2971	3082	3193	3304	3415̄	3525	3636	3747	3858
21	3968	4079	4190	4301	4411	4522	4633	4744	4854	4965
22	5076	5187	5297	5408	5519	5630	5740	5851	5962	6072
23	6183	6294	6404	6515	6626	6737	6847	6958	7069	7179
24	7290	7401	7511	7622	7733	7843	7954	8065̄	8175	8286
25	8397	8507	8618	8729	8839	8950	9060	9171	9282	9392
26	9503	9614	9724	9835̄	9945	0̄056	0̄167	0̄277	0̄388	0̄498
27	594 0609	0720	0830	0941	1051	1162	1273	1383	1494	1604
28	1715̄	1825	1936	2046	2157	2268	2378	2489	2599	2710
29	2820	2931	3041	3152	3262	3373	3483	3594	3704	3815̄
3930	3926	4036	4147	4257	4368	4478	4588	4699	4809	4920
31	5030	5141	5251	5362	5472	5583	5693	5804	5914	6025̄
32	6135	6246	6356	6466	6577	6687	6798	6908	7019	7129
33	7239	7350	7460	7571	7681	7792	7902	8012	8123	8233
34	8344	8454	8564	8675̄	8785	8895	9006	9116	9227	9337
35	9447	9558	9668	9778	9889	9999	0̄110	0̄220	0̄330	0̄441
36	595 0551	0661	0772	0882	0992	1103	1213	1323	1434	1544
37	1654	1764	1875̄	1985	2095	2206	2316	2426	2537	2647
38	2757	2867	2978	3088	3198	3308	3419	3529	3639	3750
39	3860	3970	4080	4191	4301	4411	4521	4632	4742	4852
3940	4962	5072	5183	5293	5403	5513	5624	5734	5844	5954
41	6064	6175̄	6285̄	6395̄	6505	6615	6725	6836	6946	7056
42	7166	7276	7387	7497	7607	7717	7827	7937	8047	8158
43	8268	8378	8488	8598	8708	8818	8929	9039	9149	9259
44	9369	9479	9589	9699	9810	9920	0̄030	0̄140	0̄250	0̄360
45	596 0470	0580	0690	0800	0910	1020	1131	1241	1351	1461
46	1571	1681	1791	1901	2011	2121	2231	2341	2451	2561
47	2671	2781	2891	3001	3111	3221	3331	3441	3551	3661
48	3771	3881	3991	4101	4211	4321	4431	4541	4651	4761
49	4871	4981	5091	5201	5311	5421	5531	5641	5751	5861
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P. P.

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51	7070	7180	7290	7400	7510	7620	7730	7840	7950	8059	
52	8169	8279	8389	8499	8609	8719	8829	8939	9048	9158	
53	9268	9378	9488	9598	9708	9817	9927	0̄037	0̄147	0̄257	
54	597 0367	0476	0586	0696	0806	0916	1026	1135	1245	1355	
55	1465	1575	1684	1794	1904	2014	2124	2233	2343	2453	
56	2563	2673	2782	2892	3002	3112	3221	3331	3441	3551	
57	3661	3770	3880	3990	4099	4209	4319	4429	4538	4648	
58	4758	4868	4977	5087	5197	5306	5416	5526	5636	5745	
59	5855	5965	6074	6184	6294	6403	6513	6623	6733	6842	
3960	6952	7062	7171	7281	7391	7500	7610	7719	7829	7939	
61	8048	8158	8268	8377	8487	8597	8706	8816	8925	9035	
62	9145	9254	9364	9474	9583	9693	9802	9912	0̄022	0̄131	
63	598 0241	0350	0460	0569	0679	0789	0898	1008	1117	1227	
64	1336	1446	1556	1665	1775	1884	1994	2103	2213	2322	
65	2432	2541	2651	2761	2870	2980	3089	3199	3308	3418	
66	3527	3637	3746	3856	3965	4075	4184	4294	4403	4513	
67	4622	4731	4841	4950	5060	5169	5279	5388	5498	5607	
68	5717	5826	5936	6045	6154	6264	6373	6483	6592	6702	
69	6811	6920	7030	7139	7249	7358	7467	7577	7686	7796	
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71	8999	9108	9218	9327	9436	9546	9655	9764	9874	9983	
72	599 0092	0202	0311	0420	0530	0639	0748	0858	0967	1076	
73	1186	1295	1404	1514	1623	1732	1841	1951	2060	2169	
74	2279	2388	2497	2606	2716	2825	2934	3044	3153	3262	
75	3371	3481	3590	3699	3808	3918	4027	4136	4245	4355	
76	4464	4573	4682	4791	4901	5010	5119	5228	5338	5447	
77	5556	5665	5774	5884	5993	6102	6211	6320	6429	6539	
78	6648	6757	6866	6975	7084	7194	7303	7412	7521	7630	
79	7739	7849	7958	8067	8176	8285	8394	8503	8612	8722	
3980	8831	8940	9049	9158	9267	9376	9485	9594	9704	9813	
81	9922	0̄031	0̄140	0̄249	0̄358	0̄467	0̄576	0̄685	0̄794	0̄903	
82	600 1013	1122	1231	1340	1449	1558	1667	1776	1885	1994	
83	2103	2212	2321	2430	2539	2648	2757	2866	2975	3084	
84	3193	3302	3411	3520	3629	3738	3847	3956	4065	4174	
85	4283	4392	4501	4610	4719	4828	4937	5046	5155	5264	
86	5373	5482	5591	5700	5809	5918	6027	6136	6244	6353	
87	6462	6571	6680	6789	6898	7007	7116	7225	7334	7443	
88	7551	7660	7769	7878	7987	8096	8205	8314	8423	8531	
89	8640	8749	8858	8967	9076	9185	9294	9402	9511	9620	
3990	9729	9838	9947	0̄055	0̄164	0̄273	0̄382	0̄491	0̄600	0̄708	
91	601 0817	0926	1035	1144	1253	1361	1470	1579	1688	1797	
92	1905	2014	2123	2232	2340	2449	2558	2667	2776	2884	
93	2993	3102	3211	3319	3428	3537	3646	3754	3863	3972	
94	4081	4189	4298	4407	4516	4624	4733	4842	4950	5059	
95	5168	5277	5385	5494	5603	5711	5820	5929	6037	6146	
96	6255	6363	6472	6581	6690	6798	6907	7016	7124	7233	
97	7341	7450	7559	7667	7776	7885	7993	8102	8211	8319	
98	8428	8537	8645	8754	8862	8971	9080	9188	9297	9405	
99	9514	9623	9731	9840	9948	0̄057	0̄166	0̄274	0̄383	0̄491	
4000	602 0600	0708	0817	0926	1034	1143	1251	1360	1468	1577	
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4000	602 0600	0708	0817	0926	1034	1143	1251	1360	1468	1577
01	1686	1794	1903	2011	2120	2228	2337	2445	2554	2662
02	2771	2879	2988	3096	3205̄	3313	3422	3530	3639	3747
03	3856	3964	4073	4181	4290	4398	4507	4615	4724	4832
04	4941	5049	5158	5266	5375̄	5483	5591	5700	5808	5917
05	6025	6134	6242	6351	6459	6567	6676	6784	6893	7001
06	7109	7218	7326	7435̄	7543	7651	7760	7868	7977	8085
07	8193	8302	8410	8519	8627	8735	8844	8952	9060	9169
08	9277	9385	9494	9602	9711	9819	9927	0̄036	0̄144	0̄252
09	603 0361	0469	0577	0686	0794	0902	1010	1119	1227	1335
4010	1444	1552	1660	1769	1877	1985	2093	2202	2310	2418
11	2527	2635̄	2743	2851	2960	3068	3176	3284	3393	3501
12	3609	3717	3826	3934	4042	4150	4259	4367	4475	4583
13	4692	4800	4908	5016	5124	5233	5341	5449	5557	5665
14	5774	5882	5990	6098	6206	6315̄	6423	6531	6639	6747
15	6855	6964	7072	7180	7288	7396	7504	7613	7721	7829
16	7937	8045	8153	8261	8370	8478	8586	8694	8802	8910
17	9018	9126	9235̄	9343	9451	9559	9667	9775	9883	9991
18	604 0099	0207	0315	0424	0532	0640	0748	0856	0964	1072
19	1180	1288	1396	1504	1612	1720	1828	1936	2044	2152
4020	2261	2369	2477	2585̄	2693	2801	2909	3017	3125̄	3233
21	3341	3449	3557	3665̄	3773	3881	3989	4097	4205̄	4313
22	4421	4529	4637	4745̄	4853	4961	5068	5176	5284	5392
23	5500	5608	5716	5824	5932	6040	6148	6256	6364	6472
24	6580	6688	6796	6903	7011	7119	7227	7335	7443	7551
25	7659	7767	7875̄	7983	8090	8198	8306	8414	8522	8630
26	8738	8846	8953	9061	9169	9277	9385̄	9493	9601	9708
27	9816	9924	0̄032	0̄140	0̄248	0̄355	0̄463	0̄571	0̄679	0̄787
28	605 0895̄	1002	1110	1218	1326	1434	1541	1649	1757	1865̄
29	1973	2080	2188	2296	2404	2512	2619	2727	2835̄	2943
4030	3050	3158	3266	3374	3482	3589	3697	3805̄	3912	4020
31	4128	4236	4343	4451	4559	4667	4774	4882	4990	5098
32	5205	5313	5421	5528	5636	5744	5851	5959	6067	6175̄
33	6282	6390	6498	6605	6713	6821	6928	7036	7144	7251
34	7359	7467	7574	7682	7790	7897	8005̄	8112	8220	8328
35	8435	8543	8651	8758	8866	8974	9081	9189	9296	9404
36	9512	9619	9727	9834	9942	0̄050	0̄157	0̄265̄	0̄372	0̄480
37	606 0587	0695	0803	0910	1018	1125	1233	1340	1448	1556
38	1663	1771	1878	1986	2093	2201	2308	2416	2523	2631
39	2739	2846	2954	3061	3169	3276	3384	3491	3599	3706
4040	3814	3921	4029	4136	4244	4351	4459	4566	4674	4781
41	4889	4996	5103	5211	5318	5426	5533	5641	5748	5856
42	5963	6071	6178	6285	6393	6500	6608	6715	6823	6930
43	7037	7145̄	7252	7360	7467	7574	7682	7789	7897	8004
44	8111	8219	8326	8434	8541	8648	8756	8863	8971	9078
45	9185	9293	9400	9507	9615̄	9722	9829	9937	0̄044	0̄151
46	607 0259	0366	0473	0581	0688	0795	0903	1010	1117	1225̄
47	1332	1439	1547	1654	1761	1869	1976	2083	2190	2298
48	2405	2512	2620	2727	2834	2941	3049	3156	3263	3371
49	3478	3585	3692	3800	3907	4014	4121	4229	4336	4443
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54	8837	8945	9052	9159	9266	9373	9480	9587	9694	9801
55	9909	0̄016	0̄123	0̄230	0̄337	0̄444	0̄551	0̄658	0̄765	0̄872
56	608 0979	1087	1194	1301	1408	1515	1622	1729	1836	1943
57	2050	2157	2264	2371	2478	2585	2692	2799	2906	3013
58	3120	3227	3334	3441	3548	3656	3763	3870	3977	4084
59	4191	4298	4404	4511	4618	4725	4832	4939	5046	5153
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61	6330	6437	6544	6651	6758	6865	6972	7078	7185	7292
62	7399	7506	7613	7720	7827	7934	8041	8148	8254	8361
63	8468	8575	8682	8789	8896	9003	9110	9216	9323	9430
64	9537	9644	9751	9858	9964	0̄071	0̄178	0̄285	0̄392	0̄499
65	609 0605	0712	0819	0926	1033	1140	1246	1353	1460	1567
66	1674	1781	1887	1994	2101	2208	2315	2421	2528	2635
67	2742	2849	2955	3062	3169	3276	3382	3489	3596	3703
68	3809	3916	4023	4130	4236	4343	4450	4557	4663	4770
69	4877	4984	5090	5197	5304	5411	5517	5624	5731	5837
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71	7011	7118	7224	7331	7438	7544	7651	7758	7864	7971
72	8078	8184	8291	8398	8504	8611	8718	8824	8931	9037
73	9144	9251	9357	9464	9571	9677	9784	9890	9997	0̄104
74	610 0210	0317	0423	0530	0637	0743	0850	0956	1063	1170
75	1276	1383	1489	1596	1702	1809	1916	2022	2129	2235
76	2342	2448	2555	2661	2768	2874	2981	3088	3194	3301
77	3407	3514	3620	3727	3833	3940	4046	4153	4259	4366
78	4472	4579	4685	4792	4898	5005	5111	5218	5324	5431
79	5537	5644	5750	5856	5963	6069	6176	6282	6389	6495
4080	6602	6708	6815	6921	7027	7134	7240	7347	7453	7560
81	7666	7772	7879	7985	8092	8198	8304	8411	8517	8624
82	8730	8836	8943	9049	9156	9262	9368	9475	9581	9687
83	9794	9900	0̄007	0̄113	0̄219	0̄326	0̄432	0̄538	0̄645	0̄751
84	611 0857	0964	1070	1176	1283	1389	1495	1602	1708	1814
85	1921	2027	2133	2240	2346	2452	2558	2665	2771	2877
86	2984	3090	3196	3302	3409	3515	3621	3728	3834	3940
87	4046	4153	4259	4365	4471	4578	4684	4790	4896	5003
88	5109	5215	5321	5428	5534	5640	5746	5852	5959	6065
89	6171	6277	6384	6490	6596	6702	6808	6915	7021	7127
4090	7233	7339	7445	7552	7658	7764	7870	7976	8082	8189
91	8295	8401	8507	8613	8719	8826	8932	9038	9144	9250
92	9356	9462	9569	9675	9781	9887	9993	0̄099	0̄205	0̄311
93	612 0417	0524	0630	0736	0842	0948	1054	1160	1266	1372
94	1478	1584	1691	1797	1903	2009	2115	2221	2327	2433
95	2539	2645	2751	2857	2963	3069	3175	3281	3387	3493
96	3599	3706	3812	3918	4024	4130	4236	4342	4448	4554
97	4660	4766	4872	4978	5084	5190	5296	5402	5508	5614
98	5720	5826	5931	6037	6143	6249	6355	6461	6567	6673
99	6779	6885	6991	7097	7203	7309	7415	7521	7627	7733
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P. P.

N.	0	1	2	3	4	5	6	7	8	9	P. P.
4100	612 7839	7944	8050	8156	8262	8368	8474	8580	8686	8792	
01	8898	9004	9109	9215	9321	9427	9533	9639	9745̄	9851	
02	9957	0̄062	0̄168	0̄274	0̄380	0̄486	0̄592	0̄698	0̄803	0̄909	
03	613 1015	1121	1227	1333	1439	1544	1650	1756	1862	1968	
04	2074	2179	2285	2391	2497	2603	2708	2814	2920	3026	
05	3132	3237	3343	3449	3555̄	3661	3766	3872	3978	4084	
06	4189	4295	4401	4507	4613	4718	4824	4930	5036	5141	106
07	5247	5353	5459	5564	5670	5776	5881	5987	6093	6199	1 10.6
08	6304	6410	6516	6621	6727	6833	6939	7044	7150	7256	2 21.2
09	7361	7467	7573	7678	7784	7890	7996	8101	8207	8313	3 31.8
4110	8418	8524	8630	8735	8841	8947	9052	9158	9263	9369	4 42.4
11	9475̄	9580	9686	9792	9897	0̄003	0̄109	0̄214	0̄320	0̄425	5 53.0
12	614 0531	0637	0742	0848	0954	1059	1165̄	1270	1376	1482	6 63.6
13	1587	1693	1798	1904	2009	2115	2221	2326	2432	2537	7 74.2 8 84.8
14	2643	2748	2854	2960	3065	3171	3276	3382	3487	3593	9 95.4
15	3698	3804	3909	4015	4121	4226	4332	4437	4543	4648	
16	4754	4859	4965̄	5070	5176	5281	5387	5492	5598	5703	
17	5809	5914	6020	6125	6231	6336	6442	6547	6652	6758	
18	6863	6969	7074	7180	7285	7391	7496	7602	7707	7812	
19	7918	8023	8129	8234	8340	8445	8550	8656	8761	8867	
4120	8972	9078	9183	9288	9394	9499	9605̄	9710	9815	9921	
21	615 0026	0132	0237	0342	0448	0553	0658	0764	0869	0975̄	105
22	1080	1185	1291	1396	1501	1607	1712	1817	1923	2028	1 10.5
23	2133	2239	2344	2449	2555̄	2660	2765	2871	2976	3081	2 21.0
24	3187	3292	3397	3502	3608	3713	3818	3924	4029	4134	3 31.5
25	4240	4345̄	4450	4555	4661	4766	4871	4976	5082	5187	4 42.0
26	5292	5397	5503	5608	5713	5818	5924	6029	6134	6239	5 52.5 6 63.0
27	6345̄	6450	6555	6660	6766	6871	6976	7081	7186	7292	7 73.5
28	7397	7502	7607	7712	7818	7923	8028	8133	8238	8344	8 84.0
29	8449	8554	8659	8764	8870	8975̄	9080	9185	9290	9395	9 94.5
4130	9501	9606	9711	9816	9921	0̄026	0̄131	0̄237	0̄342	0̄447	
31	616 0552	0657	0762	0867	0972	1078	1183	1288	1393	1498	
32	1603	1708	1813	1918	2024	2129	2234	2339	2444	2549	
33	2654	2759	2864	2969	3074	3179	3284	3390	3495̄	3600	
34	3705̄	3810	3915̄	4020	4125̄	4230	4335	4440	4545	4650	
35	4755	4860	4965	5070	5175	5280	5385	5490	5595	5700	
36	5805	5910	6015	6120	6225	6330	6435	6540	6645	6750	104
37	6855	6960	7065	7170	7275	7380	7485	7590	7695̄	7800	1 10.4
38	7905̄	8010	8115̄	8220	8325̄	8430	8535̄	8639	8744	8849	2 20.8
39	8954	9059	9164	9269	9374	9479	9584	9689	9794	9899	3 31.2 4 41.6
4140	617 0003	0108	0213	0318	0423	0528	0633	0738	0843	0947	5 52.0
41	1052	1157	1262	1367	1472	1577	1682	1786	1891	1996	6 62.4
42	2101	2206	2311	2415	2520	2625	2730	2835̄	2940	3045̄	7 72.8
43	3149	3254	3359	3464	3569	3673	3778	3883	3988	4093	8 83.2 9 93.6
44	4197	4302	4407	4512	4617	4721	4826	4931	5036	5141	
45	5245	5350	5455̄	5560	5664	5769	5874	5979	6083	6188	
46	6293	6398	6502	6607	6712	6817	6921	7026	7131	7236	
47	7340	7445	7550	7655̄	7759	7864	7969	8073	8178	8283	
48	8387	8492	8597	8702	8806	8911	9016	9120	9225̄	9330	
49	9434	9539	9644	9748	9853	9958	0̄062	0̄167	0̄272	0̄376	
4150	618 0481	0586	0690	0795̄	0900	1004	1109	1213	1318	1423	
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N.	0	1	2	3	4	5	6	7	8	9	P. P.
4150	618 0481	0586	0690	0795̄	0900	1004	1109	1213	1318	1423	
51	1527	1632	1737	1841	1946	2050	2155	2260	2364	2469	
52	2573	2678	2783	2887	2992	3096	3201	3306	3410	3515̄	
53	3619	3724	3828	3933	4038	4142	4247	4351	4456	4560	
54	4665̄	4769	4874	4979	5083	5188	5292	5397	5501	5606	
55	5710	5815̄	5919	6024	6128	6233	6337	6442	6546	6651	
56	6755	6860	6964	7069	7173	7278	7382	7487	7591	7696	
57	7800	7905̄	8009	8114	8218	8323	8427	8531	8636	8740	105 1 10.5 2 21.0 3 31.5 4 42.0 5 52.5 6 63.0 7 73.5 8 84.0 9 94.5
58	8845̄	8949	9054	9158	9263	9367	9471	9576	9680	9785̄	
59	9889	9994	0̄098	0̄202	0̄307	0̄411	0̄516	0̄620	0̄725̄	0̄829	
4160	619 0933	1038	1142	1246	1351	1455	1560	1664	1768	1873	
61	1977	2082	2186	2290	2395̄	2499	2603	2708	2812	2916	
62	3021	3125	3229	3334	3438	3542	3647	3751	3855	3960	
63	4064	4168	4273	4377	4481	4586	4690	4794	4899	5003	
64	5107	5212	5316	5420	5524	5629	5733	5837	5942	6046	
65	6150	6254	6359	6463	6567	6671	6776	6880	6984	7088	
66	7193	7297	7401	7505	7610	7714	7818	7922	8027	8131	
67	8235	8339	8443	8548	8652	8756	8860	8964	9069	9173	
68	9277	9381	9485	9590	9694	9798	9902	0̄006	0̄111	0̄215̄	
69	620 0319	0423	0527	0631	0736	0840	0944	1048	1152	1256	
4170	1361	1465̄	1569	1673	1777	1881	1985	2090	2194	2298	
71	2402	2506	2610	2714	2818	2922	3027	3131	3235̄	3339	104 1 10.4 2 20.8 3 31.2 4 41.6 5 52.0 6 62.4 7 72.8 8 83.2 9 93.6
72	3443	3547	3651	3755	3859	3963	4068	4172	4276	4380	
73	4484	4588	4692	4796	4900	5004	5108	5212	5316	5420	
74	5524	5628	5733	5837	5941	6045̄	6149	6253	6357	6461	
75	6565̄	6669	6773	6877	6981	7085̄	7189	7293	7397	7501	
76	7605̄	7709	7813	7917	8021	8125̄	8229	8333	8437	8541	
77	8645̄	8749	8853	8957	9061	9165̄	9269	9373	9476	9580	
78	9684	9788	9892	9996	0̄100	0̄204	0̄308	0̄412	0̄516	0̄620	
79	621 0724	0828	0932	1035	1139	1243	1347	1451	1555	1659	
4180	1763	1867	1971	2075̄	2178	2282	2386	2490	2594	2698	
81	2802	2906	3009	3113	3217	3321	3425̄	3529	3633	3736	
82	3840	3944	4048	4152	4256	4359	4463	4567	4671	4775̄	
83	4879	4982	5086	5190	5294	5398	5502	5605	5709	5813	
84	5917	6021	6124	6228	6332	6436	6540	6643	6747	6851	
85	6955̄	7058	7162	7266	7370	7473	7577	7681	7785̄	7888	
86	7992	8096	8200	8303	8407	8511	8615̄	8718	8822	8926	
87	9030	9133	9237	9341	9444	9548	9652	9756	9859	9963	103 1 10.3 2 20.6 3 30.9 4 41.2 5 51.5 6 61.8 7 72.1 8 82.4 9 92.7
88	622 0067	0170	0274	0378	0482	0585	0689	0793	0896	1000	
89	1104	1207	1311	1415̄	1518	1622	1726	1829	1933	2037	
4190	2140	2244	2348	2451	2555̄	2658	2762	2866	2969	3073	
91	3177	3280	3384	3487	3591	3695̄	3798	3902	4006	4109	
92	4213	4316	4420	4524	4627	4731	4834	4938	5041	5145	
93	5249	5352	5456	5559	5663	5766	5870	5974	6077	6181	
94	6284	6388	6491	6595̄	6698	6802	6906	7009	7113	7216	
95	7320	7423	7527	7630	7734	7837	7941	8044	8148	8251	
96	8355̄	8458	8562	8665	8769	8872	8976	9079	9183	9286	
97	9390	9493	9597	9700	9804	9907	0̄011	0̄114	0̄217	0̄321	
98	623 0424	0528	0631	0735̄	0838	0942	1045	1148	1252	1355	
99	1459	1562	1666	1769	1872	1976	2079	2183	2286	2389	
4200	2493	2596	2700	2803	2906	3010	3113	3217	3320	3423	
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4200 — 4250

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4200	623 2493	2596	2700	2803	2906	3010	3113	3217	3320	3423
01	3527	3630	3734	3837	3940	4044	4147	4250	4354	4457
02	4560	4664	4767	4871	4974	5077	5181	5284	5387	5491
03	5594	5697	5801	5904	6007	6111	6214	6317	6420	6524
04	6627	6730	6834	6937	7040	7144	7247	7350	7453	7557
05	7660	7763	7867	7970	8073	8176	8280	8383	8486	8589
06	8693	8796	8899	9002	9106	9209	9312	9415	9519	9622
07	9725	9828	9932	0̄035̄	0̄138	0̄241	0̄344	0̄448	0̄551	0̄654
08	624 0757	0861	0964	1067	1170	1273	1377	1480	1583	1686
09	1789	1892	1996	2099	2202	2305	2408	2511	2615̄	2718
4210	2821	2924	3027	3130	3234	3337	3440	3543	3646	3749
11	3852	3956	4059	4162	4265̄	4368	4471	4574	4677	4781
12	4884	4987	5090	5193	5296	5399	5502	5605	5708	5812
13	5915̄	6018	6121	6224	6327	6430	6533	6636	6739	6842
14	6945	7048	7151	7254	7358	7461	7564	7667	7770	7873
15	7976	8079	8182	8285̄	8388	8491	8594	8697	8800	8903
16	9006	9109	9212	9315	9418	9521	9624	9727	9830	9933
17	625 0036	0139	0242	0345̄	0448	0551	0654	0757	0860	0963
18	1066	1169	1272	1375̄	1478	1581	1683	1786	1889	1992
19	2095	2198	2301	2404	2507	2610	2713	2816	2919	3022
4220	3125̄	3227	3330	3433	3536	3639	3742	3845̄	3948	4051
21	4154	4256	4359	4462	4565	4668	4771	4874	4977	5079
22	5182	5285	5388	5491	5594	5697	5799	5902	6005	6108
23	6211	6314	6416	6519	6622	6725̄	6828	6931	7033	7136
24	7239	7342	7445̄	7548	7650	7753	7856	7959	8062	8164
25	8267	8370	8473	8575	8678	8781	8884	8987	9089	9192
26	9295̄	9398	9500	9603	9706	9809	9911	0̄014	0̄117	0̄220
27	626 0322	0425	0528	0631	0733	0836	0939	1042	1144	1247
28	1350	1453	1555	1658	1761	1863	1966	2069	2171	2274
29	2377	2480	2582	2685̄	2788	2890	2993	3096	3198	3301
4230	3404	3506	3609	3712	3814	3917	4020	4122	4225̄	4328
31	4430	4533	4636	4738	4841	4943	5046	5149	5251	5354
32	5457	5559	5662	5764	5867	5970	6072	6175̄	6277	6380
33	6483	6585	6688	6790	6893	6996	7098	7201	7303	7406
34	7509	7611	7714	7816	7919	8021	8124	8226	8329	8432
35	8534	8637	8739	8842	8944	9047	9149	9252	9354	9457
36	9560	9662	9765̄	9867	9970	0̄072	0̄175̄	0̄277	0̄380	0̄482
37	627 0585̄	0687	0790	0892	0995̄	1097	1200	1302	1405̄	1507
38	1610	1712	1814	1917	2019	2122	2224	2327	2429	2532
39	2634	2737	2839	2942	3044	3146	3249	3351	3454	3556
4240	3659	3761	3863	3966	4068	4171	4273	4376	4478	4580
41	4683	4785	4888	4990	5092	5195̄	5297	5399	5502	5604
42	5707	5809	5911	6014	6116	6219	6321	6423	6526	6628
43	6730	6833	6935	7037	7140	7242	7344	7447	7549	7651
44	7754	7856	7958	8061	8163	8265	8368	8470	8572	8675̄
45	8777	8879	8982	9084	9186	9288	9391	9493	9595	9698
46	9800	9902	0̄004	0̄107	0̄209	0̄311	0̄414	0̄516	0̄618	0̄720
47	628 0823	0925̄	1027	1129	1232	1334	1436	1538	1641	1743
48	1845	1947	2050	2152	2254	2356	2458	2561	2663	2765
49	2867	2970	3072	3174	3276	3378	3481	3583	3685̄	3787
4250	3889	3991	4094	4196	4298	4400	4502	4605̄	4707	4809
N.	0	1	2	3	4	5	6	7	8	9

P. P.

	104
1	10.4
2	20.8
3	31.2
4	41.6
5	52.0
6	62.4
7	72.8
8	83.2
9	93.6

	103
1	10.3
2	20.6
3	30.9
4	41.2
5	51.5
6	61.8
7	72.1
8	82.4
9	92.7

	102
1	10.2
2	20.4
3	30.6
4	40.8
5	51.0
6	61.2
7	71.4
8	81.6
9	91.8

P. P.

4250 — 4300

N.	0	1	2	3	4	5	6	7	8	9
4250	628 3889	3991	4094	4196	4298	4400	4502	4605̄	4707	4809
51	4911	5013	5115	5218	5320	5422	5524	5626	5728	5830
52	5933	6035̄	6137	6239	6341	6443	6545	6647	6750	6852
53	6954	7056	7158	7260	7362	7464	7566	7669	7771	7873
54	7975̄	8077	8179	8281	8383	8485	8587	8689	8792	8894
55	8996	9098	9200	9302	9404	9506	9608	9710	9812	9914
56	629 0016	0118	0220	0322	0424	0526	0628	0730	0832	0934
57	1037	1139	1241	1343	1445̄	1547	1649	1751	1853	1955̄
58	2057	2159	2261	2363	2465̄	2567	2668	2770	2872	2974
59	3076	3178	3280	3382	3484	3586	3688	3790	3892	3994
4260	4096	4198	4300	4402	4504	4606	4708	4810	4911	5013
61	5115	5217	5319	5421	5523	5625̄	5727	5829	5931	6033
62	6134	6236	6338	6440	6542	6644	6746	6848	6950	7051
63	7153	7255	7357	7459	7561	7663	7765̄	7866	7968	8070
64	8172	8274	8376	8478	8579	8681	8783	8885̄	8987	9089
65	9190	9292	9394	9496	9598	9699	9801	9903	0̄005̄	0̄107
66	630 0209	0310	0412	0514	0616	0717	0819	0921	1023	1125̄
67	1226	1328	1430	1532	1634	1735	1837	1939	2041	2142
68	2244	2346	2448	2549	2651	2753	2855̄	2956	3058	3160
69	3262	3363	3465	3567	3668	3770	3872	3974	4075	4177
4270	4279	4380	4482	4584	4686	4787	4889	4991	5092	5194
71	5296	5397	5499	5601	5702	5804	5906	6007	6109	6211
72	6312	6414	6516	6617	6719	6821	6922	7024	7126	7227
73	7329	7431	7532	7634	7735	7837	7939	8040	8142	8244
74	8345	8447	8548	8650	8752	8853	8955̄	9056	9158	9260
75	9361	9463	9564	9666	9768	9869	9971	0̄072	0̄174	0̄275
76	631 0377	0479	0580	0682	0783	0885̄	0986	1088	1189	1291
77	1393	1494	1596	1697	1799	1900	2002	2103	2205̄	2306
78	2408	2509	2611	2712	2814	2915	3017	3118	3220	3321
79	3423	3524	3626	3727	3829	3930	4032	4133	4235̄	4336
4280	4438	4539	4641	4742	4844	4945	5046	5148	5249	5351
81	5452	5554	5655	5757	5858	5959	6061	6162	6264	6365
82	6467	6568	6669	6771	6872	6974	7075	7177	7278	7379
83	7481	7582	7684	7785̄	7886	7988	8089	8190	8292	8393
84	8495̄	8596	8697	8799	8900	9001	9103	9204	9306	9407
85	9508	9610	9711	9812	9914	0̄015̄	0̄116	0̄218	0̄319	0̄420
86	632 0522	0623	0724	0826	0927	1028	1130	1231	1332	1434
87	1535̄	1636	1737	1839	1940	2041	2143	2244	2345	2446
88	2548	2649	2750	2852	2953	3054	3155	3257	3358	3459
89	3560	3662	3763	3864	3965	4067	4168	4269	4370	4472
4290	4573	4674	4775	4877	4978	5079	5180	5282	5383	5484
91	5585	5686	5788	5889	5990	6091	6192	6294	6395̄	6496
92	6597	6698	6800	6901	7002	7103	7204	7305	7407	7508
93	7609	7710	7811	7912	8014	8115̄	8216	8317	8418	8519
94	8620	8722	8823	8924	9025̄	9126	9227	9328	9429	9531
95	9632	9733	9834	9935	0̄036	0̄137	0̄238	0̄339	0̄441	0̄542
96	633 0643	0744	0845̄	0946	1047	1148	1249	1350	1451	1552
97	1654	1755̄	1856	1957	2058	2159	2260	2361	2462	2563
98	2664	2765	2866	2967	3068	3169	3270	3371	3472	3573
99	3674	3775	3876	3978	4079	4180	4281	4382	4483	4584
4300	4685̄	4786	4887	4988	5089	5190	5291	5391	5492	5593
N.	0	1	2	3	4	5	6	7	8	9

P. P.

	103
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2	20.6
3	30.9
4	41.2
5	51.5
6	61.8
7	72.1
8	82.4
9	92.7

	102
1	10.2
2	20.4
3	30.6
4	40.8
5	51.0
6	61.2
7	71.4
8	81.6
9	91.8

	101
1	10.1
2	20.2
3	30.3
4	40.4
5	50.5
6	60.6
7	70.7
8	80.8
9	90.9

P. P.

N.	0	1	2	3	4	5	6	7	8	9	P. P.
4300	633 46855̄	4786	4887	4988	5089	5190	5291	5391	5492	5593	
01	5694	5795	5896	5997	6098	6199	6300	6401	6502	6603	
02	6704	6805	6906	7007	7108	7209	7310	7411	7512	7613	
03	7713	7814	7915	8016	8117	8218	8319	8420	8521	8622	
04	8723	8824	8924	9025	9126	9227	9328	9429	9530	9631	
05	9732	9832	9933	0̄034	0̄135	0̄236	0̄337	0̄438	0̄539	0̄639	
06	634 0740	0841	0942	1043	1144	1245̄	1345	1446	1547	1648	
07	1749	1850	1950	2051	2152	2253	2354	2455̄	2555	2656	101
08	2757	2858	2959	3059	3160	3261	3362	3463	3563	3664	1 10.1
09	3765̄	3866	3967	4067	4168	4269	4370	4470	4571	4672	2 20.2
4310	4773	4873	4974	5075̄	5176	5276	5377	5478	5579	5679	3 30.3 4 40.4
11	5780	5881	5982	6082	6183	6284	6385̄	6485	6586	6687	5 50.5 6 60.6
12	6788	6888	6989	7090	7190	7291	7392	7492	7593	7694	7 70.7
13	7795̄	7895	7996	8097	8197	8298	8399	8499	8600	8701	8 80.8
14	8801	8902	9003	9103	9204	9305̄	9405	9506	9607	9707	9 90.9
15	9808	9909	0̄009	0̄110	0̄211	0̄311	0̄412	0̄512	0̄613	0̄714	
16	635 0814	0915̄	1016	1116	1217	1317	1418	1519	1619	1720	
17	1820	1921	2022	2122	2223	2323	2424	2525̄	2625	2726	
18	2826	2927	3028	3128	3229	3329	3430	3530	3631	3731	
19	3832	3933	4033	4134	4234	4335̄	4435	4536	4636	4737	
4320	4837	4938	5039	5139	5240	5340	5441	5541	5642	5742	
21	5843	5943	6044	6144	6245̄	6345	6446	6546	6647	6747	100
22	6848	6948	7049	7149	7250	7350	7450	7551	7651	7752	1 10.0
23	7852	7953	8053	8154	8254	8355̄	8455	8556	8656	8756	2 20.0
24	8857	8957	9058	9158	9259	9359	9459	9560	9660	9761	3 30.0
25	9861	9962	0̄062	0̄162	0̄263	0̄363	0̄464	0̄564	0̄664	0̄765̄	4 40.0
26	636 0865	0966	1066	1166	1267	1367	1467	1568	1668	1769	5 50.0 6 60.0
27	1869	1969	2070	2170	2270	2371	2471	2571	2672	2772	7 70.0
28	2873	2973	3073	3174	3274	3374	3475̄	3575̄	3675	3776	8 80.0
29	3876	3976	4076	4177	4277	4377	4478	4578	4678	4779	9 90.0
4330	4879	4979	5080	5180	5280	5380	5481	5581	5681	5782	
31	5882	5982	6082	6183	6283	6383	6483	6584	6684	6784	
32	6884	6985̄	7085̄	7185	7285	7386	7486	7586	7686	7787	
33	7887	7987	8087	8188	8288	8388	8488	8588	8689	8789	
34	8889	8989	9089	9190	9290	9390	9490	9590	9691	9791	
35	9891	9991	0̄091	0̄192	0̄292	0̄392	0̄492	0̄592	0̄692	0̄793	
36	637 0893	0993	1093	1193	1293	1394	1494	1594	1694	1794	99
37	1894	1994	2094	2195̄	2295̄	2395̄	2495	2595	2695	2795	1 9.9
38	2895	2996	3096	3196	3296	3396	3496	3596	3696	3796	2 19.8
39	3897	3997	4097	4197	4297	4397	4497	4597	4697	4797	3 29.7 4 39.6
4340	4897	4997	5097	5197	5298	5398	5498	5598	5698	5798	5 49.5
41	5898	5998	6098	6198	6298	6398	6498	6598	6698	6798	6 59.4
42	6898	6998	7098	7198	7298	7398	7498	7598	7698	7798	7 69.3
43	7898	7998	8098	8198	8298	8398	8498	8598	8698	8798	8 79.2
44	8898	8998	9098	9198	9298	9398	9498	9598	9698	9798	9 89.1
45	9898	9998	0̄098	0̄198	0̄298	0̄398	0̄497	0̄597	0̄697	0̄797	
46	638 0897	0997	1097	1197	1297	1397	1497	1597	1697	1796	
47	1896	1996	2096	2196	2296	2396	2496	2596	2696	2795	
48	2895	2995	3095	3195̄	3295̄	3395̄	3495̄	3594	3694	3794	
49	3894	3994	4094	4194	4294	4393	4493	4593	4693	4793	
4350	4893	4992	5092	5192	5292	5392	5492	5591	5691	5791	
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N.	0	1	2	3	4	5	6	7	8	9
4350	638 4893	4992	5092	5192	5292	5392	5492	5591	5691	5791
51	5891	5991	6090	6190	6290	6390	6490	6589	6689	6789
52	6889	6989	7088	7188	7288	7388	7488	7587	7687	7787
53	7887	7986	8086	8186	8286	8385	8485	8585̄	8685̄	8784
54	8884	8984	9084	9183	9283	9383	9483	9582	9682	9782
55	9882	9981	0̄081	0̄181	0̄280	0̄380	0̄480	0̄580	0̄679	0̄779
56	639 0879	0978	1078	1178	1277	1377	1477	1577	1676	1776
57	1876	1975	2075̄	2175̄	2274	2374	2474	2573	2673	2773
58	2872	2972	3072	3171	3271	3371	3470	3570	3669	3769
59	3869	3968	4068	4168	4267	4367	4466	4566	4666	4765
4360	4865̄	4965̄	5064	5164	5263	5363	5463	5562	5662	5761
61	5861	5960	6060	6160	6259	6359	6458	6558	6657	6757
62	6857	6956	7056	7155	7255̄	7354	7454	7553	7653	7753
63	7852	7952	8051	8151	8250	8350	8449	8549	8648	8748
64	8847	8947	9046	9146	9245	9345̄	9444	9544	9643	9743
65	9842	9942	0̄041	0̄141	0̄240	0̄340	0̄439	0̄539	0̄638	0̄738
66	640 0837	0937	1036	1136	1235	1335̄	1434	1534	1633	1732
67	1832	1931	2031	2130	2230	2329	2429	2528	2627	2727
68	2826	2926	3025	3125̄	3224	3323	3423	3522	3622	3721
69	3820	3920	4019	4119	4218	4317	4417	4516	4616	4715̄
4370	4814	4914	5013	5113	5212	5311	5411	5510	5609	5709
71	5808	5907	6007	6106	6205	6305̄	6404	6504	6603	6702
72	6802	6901	7000	7100	7199	7298	7398	7497	7596	7695
73	7795̄	7894	7993	8093	8192	8291	8391	8490	8589	8688
74	8788	8887	8986	9086	9185̄	9284	9383	9483	9582	9681
75	9781	9880	9979	0̄078	0̄178	0̄277	0̄376	0̄475	0̄575̄	0̄674
76	641 0773	0872	0972	1071	1170	1269	1369	1468	1567	1666
77	1765	1865̄	1964	2063	2162	2262	2361	2460	2559	2658
78	2758	2857	2956	3055	3154	3254	3353	3452	3551	3650
79	3749	3849	3948	4047	4146	4245	4344	4444	4543	4642
4380	4741	4840	4939	5039	5138	5237	5336	5435	5534	5633
81	5733	5832	5931	6030	6129	6228	6327	6426	6526	6625̄
82	6724	6823	6922	7021	7120	7219	7318	7417	7517	7616
83	7715̄	7814	7913	8012	8111	8210	8309	8408	8507	8606
84	8705	8805̄	8904	9003	9102	9201	9300	9399	9498	9597
85	9696	9795	9894	9993	0̄092	0̄191	0̄290	0̄389	0̄488	0̄587
86	642 0686	0785	0884	0983	1082	1181	1280	1379	1478	1577
87	1676	1775	1874	1973	2072	2171	2270	2369	2468	2567
88	2666	2765	2864	2963	3062	3161	3260	3359	3458	3557
89	3656	3755̄	3854	3953	4052	4151	4249	4348	4447	4546
4390	4645	4744	4843	4942	5041	5140	5239	5338	5437	5535
91	5634	5733	5832	5931	6030	6129	6228	6327	6426	6524
92	6623	6722	6821	6920	7019	7118	7217	7315	7414	7513
93	7612	7711	7810	7909	8007	8106	8205	8304	8403	8502
94	8601	8699	8798	8897	8996	9095̄	9194	9292	9391	9490
95	9589	9688	9786	9885	9984	0̄083	0̄182	0̄280	0̄379	0̄478
96	643 0577	0676	0774	0873	0972	1071	1170	1268	1367	1466
97	1565̄	1663	1762	1861	1960	2058	2157	2256	2355̄	2454
98	2552	2651	2750	2848	2947	3046	3145̄	3243	3342	3441
99	3540	3638	3737	3836	3935̄	4033	4132	4231	4329	4428
4400	4527	4625	4724	4823	4922	5020	5119	5218	5316	5415
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P. P.

	100
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7	70.0
8	80.0
9	90.0

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2	19.8
3	29.7
4	39.6
5	49.5
6	59.4
7	69.3
8	79.2
9	89.1

	98
1	9.8
2	19.6
3	29.4
4	39.2
5	49.0
6	58.8
7	68.6
8	78.4
9	88.2

P. P.

4400 — 4450

N.	0	1	2	3	4	5	6	7	8	9	P. P.
4400	643 4527	4625	4724	4823	4922	5020	5119	5218	5316	5415	
01	5514	5612	5711	5810	5908	6007	6106	6204	6303	6402	
02	6500	6599	6698	6796	6895̄	6994	7092	7191	7290	7388	
03	7487	7585	7684	7783	7881	7980	8079	8177	8276	8374	
04	8473	8572	8670	8769	8868	8966	9065̄	9163	9262	9361	
05	9459	9558	9656	9755̄	9853	9952	0̄051	0̄149	0̄248	0̄346	
06	644 0445̄	0543	0642	0741	0839	0938	1036	1135̄	1233	1332	
07	1431	1529	1628	1726	1825̄	1923	2022	2120	2219	2317	99 1 9.9 2 19.8 3 29.7 4 39.6 5 49.5 6 59.4 7 69.3 8 79.2 9 89.1
08	2416	2514	2613	2711	2810	2908	3007	3105	3204	3302	
09	3401	3499	3598	3696	3795̄	3893	3992	4090	4189	4287	
4410	4386	4484	4583	4681	4780	4878	4977	5075	5174	5272	
11	5371	5469	5567	5666	5764	5863	5961	6060	6158	6257	
12	6355	6453	6552	6650	6749	6847	6946	7044	7142	7241	
13	7339	7438	7536	7635̄	7733	7831	7930	8028	8127	8225̄	
14	8323	8422	8520	8618	8717	8815	8914	9012	9110	9209	
15	9307	9405	9504	9602	9701	9799	9897	9996	0̄094	0̄192	
16	645 0291	0389	0487	0586	0684	0782	0881	0979	1077	1176	
17	1274	1372	1471	1569	1667	1766	1864	1962	2061	2159	
18	2257	2355	2454	2552	2650	2749	2847	2945	3043	3142	
19	3240	3338	3437	3535̄	3633	3731	3830	3928	4026	4124	
4420	4223	4321	4419	4517	4616	4714	4812	4910	5009	5107	
21	5205	5303	5402	5500	5598	5696	5795̄	5893	5991	6089	98 1 9.8 2 19.6 3 29.4 4 39.2 5 49.0 6 58.8 7 68.6 8 78.4 9 88.2
22	6187	6286	6384	6482	6580	6678	6777	6875̄	6973	7071	
23	7169	7268	7366	7464	7562	7660	7758	7857	7955̄	8053	
24	8151	8249	8348	8446	8544	8642	8740	8838	8936	9035̄	
25	9133	9231	9329	9427	9525	9623	9722	9820	9918	0̄016	
26	646 0114	0212	0310	0408	0507	0605̄	0703	0801	0899	0997	
27	1095	1193	1291	1390	1488	1586	1684	1782	1880	1978	
28	2076	2174	2272	2370	2468	2566	2665̄	2763	2861	2959	
29	3057	3155̄	3253	3351	3449	3547	3645	3743	3841	3939	
4430	4037	4135	4233	4331	4429	4527	4625	4723	4821	4919	
31	5018	5116	5214	5312	5410	5508	5606	5704	5802	5900	
32	5998	6096	6193	6291	6389	6487	6585	6683	6781	6879	
33	6977	7075	7173	7271	7369	7467	7565	7663	7761	7859	
34	7957	8055̄	8153	8251	8349	8447	8545̄	8642	8740	8838	
35	8936	9034	9132	9230	9328	9426	9524	9622	9720	9817	
36	9915	0̄013	0̄111	0̄209	0̄307	0̄405̄	0̄503	0̄601	0̄699	0̄796	97 1 9.7 2 19.4 3 29.1 4 38.8 5 48.5 6 58.2 7 67.9 8 77.6 9 87.3
37	647 0894	0992	1090	1188	1286	1384	1482	1579	1677	1775	
38	1873	1971	2069	2167	2264	2362	2460	2558	2656	2754	
39	2851	2949	3047	3145̄	3243	3341	3438	3536	3634	3732	
4440	3830	3928	4025	4123	4221	4319	4417	4514	4612	4710	
41	4808	4906	5003	5101	5199	5297	5394	5492	5590	5688	
42	5786	5883	5981	6079	6177	6274	6372	6470	6568	6665	
43	6763	6861	6959	7056	7154	7252	7350	7447	7545	7643	
44	7741	7838	7936	8034	8131	8229	8327	8425̄	8522	8620	
45	8718	8815	8913	9011	9108	9206	9304	9402	9499	9597	
46	9695̄	9792	9890	9988	0̄085	0̄183	0̄281	0̄378	0̄476	0̄574	
47	648 0671	0769	0867	0964	1062	1160	1257	1355̄	1453	1550	
48	1648	1745	1843	1941	2038	2136	2234	2331	2429	2526	
49	2624	2722	2819	2917	3015̄	3112	3210	3307	3405̄	3503	
4450	3600	3698	3795	3893	3990	4088	4186	4283	4381	4478	
N.	0	1	2	3	4	5	6	7	8	9	P. P.

N.	0	1	2	3	4	5	6	7	8	9
4450	648 3600	3698	3795	3893	3990	4088	4186	4283	4381	4478
51	4576	4674	4771	4869	4966	5064	5161	5259	5356	5454
52	5552	5649	5747	5844	5942	6039	6137	6234	6332	6429
53	6527	6624	6722	6820	6917	7015̄	7112	7210	7307	7405̄
54	7502	7600	7697	7795̄	7892	7990	8087	8185̄	8282	8380
55	8477	8575̄	8672	8770	8867	8964	9062	9159	9257	9354
56	9452	9549	9647	9744	9842	9939	0̄037	0̄134	0̄231	0̄329
57	649 0426	0524	0621	0719	0816	0914	1011	1108	1206	1303
58	1401	1498	1595	1693	1790	1888	1985	2083	2180	2277
59	2375̄	2472	2570	2667	2764	2862	2959	3056	3154	3251
4460	3349	3446	3543	3641	3738	3835	3933	4030	4128	4225̄
61	4322	4420	4517	4614	4712	4809	4906	5004	5101	5198
62	5296	5393	5490	5588	5685̄	5782	5880	5977	6074	6172
63	6269	6366	6463	6561	6658	6755	6853	6950	7047	7145̄
64	7242	7339	7436	7534	7631	7728	7826	7923	8020	8117
65	8215̄	8312	8409	8506	8604	8701	8798	8895	8993	9090
66	9187	9284	9382	9479	9576	9673	9771	9868	9965	0̄062
67	650 0160	0257	0354	0451	0548	0646	0743	0840	0937	1034
68	1132	1229	1326	1423	1520	1618	1715̄	1812	1909	2006
69	2104	2201	2298	2395	2492	2589	2687	2784	2881	2978
4470	3075	3172	3270	3367	3464	3561	3658	3755	3852	3950
71	4047	4144	4241	4338	4435	4532	4629	4727	4824	4921
72	5018	5115	5212	5309	5406	5503	5601	5698	5795̄	5892
73	5989	6086	6183	6280	6377	6474	6571	6669	6766	6863
74	6960	7057	7154	7251	7348	7445	7542	7639	7736	7833
75	7930	8027	8124	8222	8319	8416	8513	8610	8707	8804
76	8901	8998	9095̄	9192	9289	9386	9483	9580	9677	9774
77	9871	9968	0̄065̄	0̄162	0̄259	0̄356	0̄453	0̄550	0̄647	0̄744
78	651 0841	0938	1035̄	1132	1229	1326	1423	1520	1617	1714
79	1811	1908	2005̄	2102	2198	2295	2392	2489	2586	2683
4480	2780	2877	2974	3071	3168	3265̄	3362	3459	3556	3653
81	3749	3846	3943	4040	4137	4234	4331	4428	4525̄	4622
82	4719	4815	4912	5009	5106	5203	5300	5397	5494	5591
83	5687	5784	5881	5978	6075̄	6172	6269	6365	6462	6559
84	6656	6753	6850	6947	7043	7140	7237	7334	7431	7528
85	7624	7721	7818	7915̄	8012	8109	8205	8302	8399	8496
86	8593	8690	8786	8883	8980	9077	9174	9270	9367	9464
87	9561	9657	9754	9851	9948	0̄045̄	0̄141	0̄238	0̄335̄	0̄432
88	652 0528	0625	0722	0819	0916	1012	1109	1206	1303	1399
89	1496	1593	1690	1786	1883	1980	2076	2173	2270	2367
4490	2463	2560	2657	2754	2850	2947	3044	3140	3237	3334
91	3431	3527	3624	3721	3817	3914	4011	4107	4204	4301
92	4397	4494	4591	4688	4784	4881	4978	5074	5171	5268
93	5364	5461	5558	5654	5751	5847	5944	6041	6137	6234
94	6331	6427	6524	6621	6717	6814	6910	7007	7104	7200
95	7297	7394	7490	7587	7683	7780	7877	7973	8070	8166
96	8263	8360	8456	8553	8649	8746	8843	8939	9036	9132
97	9229	9325	9422	9519	9615	9712	9808	9905̄	0̄001	0̄098
98	653 0195̄	0291	0388	0484	0581	0677	0774	0870	0967	1063
99	1160	1256	1353	1450	1546	1643	1739	1836	1932	2029
4500	2125	2222	2318	2415̄	2511	2608	2704	2801	2897	2994
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P. P.

	98
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4	39.2
5	49.0
6	58.8
7	68.6
8	78.4
9	88.2

	97
1	9.7
2	19.4
3	29.1
4	38.8
5	48.5
6	58.2
7	67.9
8	77.6
9	87.3

	96
1	9.6
2	19.2
3	28.8
4	38.4
5	48.0
6	57.6
7	67.2
8	76.8
9	86.4

P. P.

N.	0	1	2	3	4	5	6	7	8	9	P. P.
4500	653 2125	2222	2318	2415̄	2511	2608	2704	2801	2897	2994	
01	3090	3187	3283	3380	3476	3573	3669	3765	3862	3958	
02	4055̄	4151	4248	4344	4441	4537	4634	4730	4827	4923	
03	5019	5116	5212	5309	5405	5502	5598	5695̄	5791	5887	
04	5984	6080	6177	6273	6369	6466	6562	6659	6755	6852	
05	6948	7044	7141	7237	7334	7430	7526	7623	7719	7815	
06	7912	8008	8105̄	8201	8297	8394	8490	8586	8683	8779	
07	8876	8972	9068	9165̄	9261	9357	9454	9550	9646	9743	97 1 9.7 2 19.4 3 29.1 4 38.8 5 48.5 6 58.2 7 67.9 8 77.6 9 87.3
08	9839	9935	0̄032	0̄128	0̄224	0̄321	0̄417	0̄513	0̄610	0̄706	
09	654 0802	0899	0995̄	1091	1188	1284	1380	1477	1573	1669	
4510	1765	1862	1958	2054	2151	2247	2343	2439	2536	2632	
11	2728	2825̄	2921	3017	3113	3210	3306	3402	3498	3595̄	
12	3691	3787	3883	3980	4076	4172	4268	4365̄	4461	4557	
13	4653	4750	4846	4942	5038	5134	5231	5327	5423	5519	
14	5616	5712	5808	5904	6000	6097	6193	6289	6385	6481	
15	6578	6674	6770	6866	6962	7058	7155̄	7251	7347	7443	
16	7539	7635	7732	7828	7924	8020	8116	8212	8309	8405̄	
17	8501	8597	8693	8789	8885	8982	9078	9174	9270	9366	
18	9462	9558	9655̄	9751	9847	9943	0̄039	0̄135	0̄231	0̄327	
19	655 0423	0520	0616	0712	0808	0904	1000	1096	1192	1288	
4520	1384	1480	1577	1673	1769	1865̄	1961	2057	2153	2249	
21	2345	2441	2537	2633	2729	2825	2921	3017	3113	3210	96 1 9.6 2 19.2 3 28.8 4 38.4 5 48.0 6 57.6 7 67.2 8 76.8 9 86.4
22	3306	3402	3498	3594	3690	3786	3882	3978	4074	4170	
23	4266	4362	4458	4554	4650	4746	4842	4938	5034	5130	
24	5226	5322	5418	5514	5610	5706	5802	5898	5994	6090	
25	6186	6282	6378	6474	6570	6666	6762	6858	6954	7050	
26	7145	7241	7337	7433	7529	7625	7721	7817	7913	8009	
27	8105̄	8201	8297	8393	8489	8585̄	8681	8776	8872	8968	
28	9064	9160	9256	9352	9448	9544	9640	9736	9831	9927	
29	656 0023	0119	0215̄	0311	0407	0503	0599	0694	0790	0886	
4530	0982	1078	1174	1270	1365	1461	1557	1653	1749	1845̄	
31	1941	2036	2132	2228	2324	2420	2516	2612	2707	2803	
32	2899	2995̄	3091	3186	3282	3378	3474	3570	3666	3761	
33	3857	3953	4049	4145̄	4240	4336	4432	4528	4624	4719	
34	4815	4911	5007	5103	5198	5294	5390	5486	5581	5677	
35	5773	5869	5964	6060	6156	6252	6347	6443	6539	6635̄	
36	6730	6826	6922	7018	7113	7209	7305̄	7401	7496	7592	95 1 9.5 2 19.0 3 28.5 4 38.0 5 47.5 6 57.0 7 66.5 8 76.0 9 85.5
37	7688	7784	7879	7975̄	8071	8166	8262	8358	8454	8549	
38	8645̄	8741	8836	8932	9028	9123	9219	9315̄	9410	9506	
39	9602	9698	9793	9889	9985̄	0̄080	0̄176	0̄272	0̄367	0̄463	
4540	657 0559	0654	0750	0845	0941	1037	1132	1228	1324	1419	
41	1515	1611	1706	1802	1898	1993	2089	2184	2280	2376	
42	2471	2567	2663	2758	2854	2949	3045̄	3141	3236	3332	
43	3427	3523	3619	3714	3810	3905	4001	4096	4192	4288	
44	4383	4479	4574	4670	4766	4861	4957	5052	5148	5243	
45	5339	5434	5530	5626	5721	5817	5912	6008	6103	6199	
46	6294	6390	6485	6581	6676	6772	6867	6963	7059	7154	
47	7250	7345	7441	7536	7632	7727	7823	7918	8014	8109	
48	8205̄	8300	8396	8491	8587	8682	8777	8873	8968	9064	
49	9159	9255̄	9350	9446	9541	9637	9732	9828	9923	0̄019	
4550	658 0114	0209	0305̄	0400	0496	0591	0687	0782	0877	0973	
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4550	658 0114	0209	0305̄	0400	0496	0591	0687	0782	0877	0973	
51	1068	1164	1259	1355̄	1450	1545	1641	1736	1832	1927	
52	2023	2118	2213	2309	2404	2500	2595̄	2690	2786	2881	
53	2977	3072	3167	3263	3358	3453	3549	3644	3740	3835̄	
54	3930	4026	4121	4216	4312	4407	4502	4598	4693	4788	
55	4884	4979	5074	5170	5265	5361	5456	5551	5647	5742	
56	5837	5932	6028	6123	6218	6314	6409	6504	6600	6695̄	
57	6790	6886	6981	7076	7171	7267	7362	7457	7553	7648	96 1 9.6 2 19.2 3 28.8 4 38.4 5 48.0 6 57.6 7 67.2 8 76.8 9 86.4
58	7743	7838	7934	8029	8124	8220	8315̄	8410	8505	8601	
59	8696	8791	8886	8982	9077	9172	9267	9363	9458	9553	
4560	9648	9744	9839	9934	0̄029	0̄125̄	0̄220	0̄315	0̄410	0̄506	
61	659 0601	0696	0791	0886	0982	1077	1172	1267	1362	1458	
62	1553	1648	1743	1838	1934	2029	2124	2219	2314	2410	
63	2505̄	2600	2695	2790	2885	2981	3076	3171	3266	3361	
64	3456	3552	3647	3742	3837	3932	4027	4122	4218	4313	
65	4408	4503	4598	4693	4788	4883	4979	5074	5169	5264	
66	5359	5454	5549	5644	5740	5835̄	5930	6025̄	6120	6215	
67	6310	6405	6500	6595	6690	6786	6881	6976	7071	7166	
68	7261	7356	7451	7546	7641	7736	7831	7926	8021	8117	
69	8212	8307	8402	8497	8592	8687	8782	8877	8972	9067	
4570	9162	9257	9352	9447	9542	9637	9732	9827	9922	0̄017	
71	660 0112	0207	0302	0397	0492	0587	0682	0777	0872	0967	95 1 9.5 2 19.0 3 28.5 4 38.0 5 47.5 6 57.0 7 66.5 8 76.0 9 85.5
72	1062	1157	1252	1347	1442	1537	1632	1727	1822	1917	
73	2012	2107	2202	2297	2392	2487	2582	2677	2772	2867	
74	2962	3057	3151	3246	3341	3436	3531	3626	3721	3816	
75	3911	4006	4101	4196	4291	4386	4481	4575	4670	4765	
76	4860	4955	5050	5145̄	5240	5335̄	5430	5524	5619	5714	
77	5809	5904	5999	6094	6189	6284	6378	6473	6568	6663	
78	6758	6853	6948	7042	7137	7232	7327	7422	7517	7612	
79	7706	7801	7896	7991	8086	8181	8275	8370	8465	8560	
4580	8655̄	8750	8844	8939	9034	9129	9224	9318	9413	9508	
81	9603	9698	9793	9887	9982	0̄077	0̄172	0̄266	0̄361	0̄456	
82	661 0551	0646	0740	0835	0930	1025̄	1120	1214	1309	1404	
83	1499	1593	1688	1783	1878	1972	2067	2162	2257	2351	
84	2446	2541	2636	2730	2825	2920	3015̄	3109	3204	3299	
85	3393	3488	3583	3678	3772	3867	3962	4056	4151	4246	
86	4341	4435	4530	4625̄	4719	4814	4909	5003	5098	5193	94 1 9.4 2 18.8 3 28.2 4 37.6 5 47.0 6 56.4 7 65.8 8 75.2 9 84.6
87	5287	5382	5477	5571	5666	5761	5855	5950	6045̄	6139	
88	6234	6329	6423	6518	6613	6707	6802	6897	6991	7086	
89	7181	7275	7370	7464	7559	7654	7748	7843	7938	8032	
4590	8127	8221	8316	8411	8505	8600	8695̄	8789	8884	8978	
91	9073	9168	9262	9357	9451	9546	9640	9735	9830	9924	
92	662 0019	0113	0208	0303	0397	0492	0586	0681	0775	0870	
93	0964	1059	1154	1248	1343	1437	1532	1626	1721	1815	
94	1910	2004	2099	2194	2288	2383	2477	2572	2666	2761	
95	2855	2950	3044	3139	3233	3328	3422	3517	3611	3706	
96	3800	3895̄	3989	4084	4178	4273	4367	4462	4556	4651	
97	4745	4840	4934	5028	5123	5217	5312	5406	5501	5595	
98	5690	5784	5879	5973	6067	6162	6256	6351	6445	6540	
99	6634	6729	6823	6917	7012	7106	7201	7295	7389	7484	
4600	7578	7673	7767	7862	7956	8050	8145̄	8239	8334	8428	
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4600	662 7578	7673	7767	7862	7956	8050	8145̄	8239	8334	8428	
01	8522	8617	8711	8805	8900	8994	9089	9183	9277	9372	
02	9466	9561	9655̄	9749	9844	9938	0̄032	0̄127	0̄221	0̄315	
03	663 0410	0504	0598	0693	0787	0881	0976	1070	1164	1259	
04	1353	1447	1542	1636	1730	1825̄	1919	2013	2108	2202	
05	2296	2391	2485̄	2579	2674	2768	2862	2956	3051	3145	
06	3239	3334	3428	3522	3616	3711	3805	3899	3994	4088	
07	4182	4276	4371	4465̄	4559	4653	4748	4842	4936	5030	95
08	5125̄	5219	5313	5407	5502	5596	5690	5784	5879	5973	1 9.5
09	6067	6161	6256	6350	6444	6538	6632	6727	6821	6915	2 19.0
4610	7009	7103	7198	7292	7386	7480	7574	7669	7763	7857	3 28.5
11	7951	8045	8140	8234	8328	8422	8516	8610	8705̄	8799	4 38.0
12	8893	8987	9081	9175	9270	9364	9458	9552	9646	9740	5 47.5
13	9835̄	9929	0̄023	0̄117	0̄211	0̄305	0̄399	0̄494	0̄588	0̄682	6 57.0
14	664 0776	0870	0964	1058	1152	1247	1341	1435̄	1529	1623	7 66.5
15	1717	1811	1905	1999	2093	2188	2282	2376	2470	2564	8 76.0
16	2658	2752	2846	2940	3034	3128	3222	3317	3411	3505̄	9 85.5
17	3599	3693	3787	3881	3975̄	4069	4163	4257	4351	4445	
18	4539	4633	4727	4821	4915	5009	5104	5198	5292	5386	
19	5480	5574	5668	5762	5856	5950	6044	6138	6232	6326	
4620	6420	6514	6608	6702	6796	6890	6984	7078	7172	7266	
21	7360	7454	7548	7642	7736	7830	7924	8018	8111	8205	94
22	8299	8393	8487	8581	8675	8769	8863	8957	9051	9145̄	1 9.4
23	9239	9333	9427	9521	9615̄	9709	9803	9896	9990	0̄084	2 18.8
24	665 0178	0272	0366	0460	0554	0648	0742	0836	0930	1023	3 28.2
25	1117	1211	1305	1399	1493	1587	1681	1775̄	1869	1962	4 37.6
26	2056	2150	2244	2338	2432	2526	2620	2713	2807	2901	5 47.0
27	2995̄	3089	3183	3277	3370	3464	3558	3652	3746	3840	6 56.4
28	3934	4027	4121	4215	4309	4403	4497	4590	4684	4778	7 65.8
29	4872	4966	5059	5153	5247	5341	5435̄	5529	5622	5716	8 75.2
4630	5810	5904	5998	6091	6185	6279	6373	6466	6560	6654	9 84.6
31	6748	6842	6935	7029	7123	7217	7310	7404	7498	7592	
32	7686	7779	7873	7967	8061	8154	8248	8342	8436	8529	
33	8623	8717	8810	8904	8998	9092	9185	9279	9373	9467	
34	9560	9654	9748	9841	9935	0̄029	0̄123	0̄216	0̄310	0̄404	
35	666 0497	0591	0685̄	0778	0872	0966	1060	1153	1247	1341	
36	1434	1528	1622	1715	1809	1903	1996	2090	2184	2277	93
37	2371	2465̄	2558	2652	2746	2839	2933	3027	3120	3214	1 9.3
38	3307	3401	3495̄	3588	3682	3776	3869	3963	4056	4150	2 18.6
39	4244	4337	4431	4525̄	4618	4712	4805	4899	4993	5086	3 27.9
4640	5180	5273	5367	5461	5554	5648	5741	5835̄	5929	6022	4 37.2
41	6116	6209	6303	6396	6490	6584	6677	6771	6864	6958	5 46.5
42	7051	7145̄	7238	7332	7426	7519	7613	7706	7800	7893	6 55.8
43	7987	8080	8174	8267	8361	8454	8548	8642	8735	8829	7 65.1
44	8922	9016	9109	9203	9296	9390	9483	9577	9670	9764	8 74.4
45	9857	9951	0̄044	0̄138	0̄231	0̄325̄	0̄418	0̄512	0̄605	0̄699	9 83.7
46	667 0792	0886	0979	1072	1166	1259	1353	1446	1540	1633	
47	1727	1820	1914	2007	2101	2194	2287	2381	2474	2568	
48	2661	2755̄	2848	2941	3035̄	3128	3222	3315	3409	3502	
49	3595	3689	3782	3876	3969	4063	4156	4249	4343	4436	
4650	4530	4623	4716	4810	4903	4996	5090	5183	5277	5370	
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N.	0	1	2	3	4	5	6	7	8	9
4650	667 4530	4623	4716	4810	4903	4996	5090	5183	5277	5370
51	5463	5557	5650	5744	5837	5930	6024	6117	6210	6304
52	6397	6490	6584	6677	6770	6864	6957	7051	7144	7237
53	7331	7424	7517	7611	7704	7797	7891	7984	8077	8170
54	8264	8357	8450	8544	8637	8730	8824	8917	9010	9104
55	9197	9290	9383	9477	9570	9663	9757	9850	9943	0̄036
56	668 0130	0223	0316	0410	0503	0596	0689	0783	0876	0969
57	1062	1156	1249	1342	1435	1529	1622	1715	1808	1902
58	1995̄	2088	2181	2275̄	2368	2461	2554	2647	2741	2834
59	2927	3020	3114	3207	3300	3393	3486	3580	3673	3766
4660	3859	3952	4046	4139	4232	4325	4418	4511	4605̄	4698
61	4791	4884	4977	5071	5164	5257	5350	5443	5536	5630
62	5723	5816	5909	6002	6095	6188	6282	6375̄	6468	6561
63	6654	6747	6840	6934	7027	7120	7213	7306	7399	7492
64	7585	7679	7772	7865̄	7958	8051	8144	8237	8330	8423
65	8516	8610	8703	8796	8889	8982	9075	9168	9261	9354
66	9447	9540	9633	9727	9820	9913	0̄006	0̄099	0̄192	0̄285̄
67	669 0378	0471	0564	0657	0750	0843	0936	1029	1122	1215
68	1308	1402	1495̄	1588	1681	1774	1867	1960	2053	2146
69	2239	2332	2425̄	2518	2611	2704	2797	2890	2983	3076
4670	3169	3262	3355̄	3448	3541	3634	3727	3820	3913	4006
71	4099	4192	4285̄	4378	4471	4564	4656	4749	4842	4935
72	5028	5121	5214	5307	5400	5493	5586	5679	5772	5865̄
73	5958	6051	6144	6237	6330	6422	6515	6608	6701	6794
74	6887	6980	7073	7166	7259	7352	7445̄	7537	7630	7723
75	7816	7909	8002	8095̄	8188	8281	8373	8466	8559	8652
76	8745	8838	8931	9024	9117	9209	9302	9395	9488	9581
77	9674	9767	9859	9952	0̄045	0̄138	0̄231	0̄324	0̄416	0̄509
78	670 0602	0695	0788	0881	0974	1066	1159	1252	1345̄	1438
79	1530	1623	1716	1809	1902	1995̄	2087	2180	2273	2366
4680	2459	2551	2644	2737	2830	2922	3015	3108	3201	3294
81	3386	3479	3572	3665̄	3758	3850	3943	4036	4129	4221
82	4314	4407	4500	4592	4685	4778	4871	4963	5056	5149
83	5242	5334	5427	5520	5613	5705	5798	5891	5983	6076
84	6169	6262	6354	6447	6540	6632	6725	6818	6911	7003
85	7096	7189	7281	7374	7467	7559	7652	7745̄	7837	7930
86	8023	8116	8208	8301	8394	8486	8579	8672	8764	8857
87	8950	9042	9135̄	9228	9320	9413	9505	9598	9691	9783
88	9876	9969	0̄061	0̄154	0̄247	0̄339	0̄432	0̄524	0̄617	0̄710
89	671 0802	0895̄	0988	1080	1173	1265	1358	1451	1543	1636
4690	1728	1821	1914	2006	2099	2191	2284	2377	2469	2562
91	2654	2747	2839	2932	3025̄	3117	3210	3302	3395̄	3487
92	3580	3673	3765	3858	3950	4043	4135	4228	4320	4413
93	4506	4598	4691	4783	4876	4968	5061	5153	5246	5338
94	5431	5523	5616	5708	5801	5893	5986	6078	6171	6263
95	6356	6448	6541	6633	6726	6818	6911	7003	7096	7188
96	7281	7373	7466	7558	7651	7743	7836	7928	8021	8113
97	8206	8298	8391	8483	8575	8668	8760	8853	8945	9038
98	9130	9223	9315	9407	9500	9592	9685̄	9777	9870	9962
99	672 0054	0147	0239	0332	0424	0517	0609	0701	0794	0886
4700	0979	1071	1163	1256	1348	1441	1533	1625	1718	1810
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P. P.

	94
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2	18.8
3	28.2
4	37.6
5	47.0
6	56.4
7	65.8
8	75.2
9	84.6

	93
1	9.3
2	18.6
3	27.9
4	37.2
5	46.5
6	55.8
7	65.1
8	74.4
9	83.7

	92
1	9.2
2	18.4
3	27.6
4	36.8
5	46.0
6	55.2
7	64.4
8	73.6
9	82.8

P. P.

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4700	672 0979	1071	1163	1256	1348	1441	1533	1625	1718	1810
01	1903	1995	2087	2180	2272	2364	2457	2549	2642	2734
02	2826	2919	3011	3103	3196	3288	3380	3473	3565	3657
03	3750	3842	3934	4027	4119	4211	4304	4396	4488	4581
04	4673	4765	4858	4950	5042	5135	5227	5319	5412	5504
05	5596	5689	5781	5873	5965	6058	6150	6242	6335	6427
06	6519	6612	6704	6796	6888	6981	7073	7165	7257	7350
07	7442	7534	7627	7719	7811	7903	7996	8088	8180	8272
08	8365	8457	8549	8641	8734	8826	8918	9010	9102	9195
09	9287	9379	9471	9564	9656	9748	9840	9932	0025	0117
4710	673 0209	0301	0393	0486	0578	0670	0762	0854	0947	1039
11	1131	1223	1315	1408	1500	1592	1684	1776	1868	1961
12	2053	2145	2237	2329	2421	2514	2606	2698	2790	2882
13	2974	3067	3159	3251	3343	3435	3527	3619	3712	3804
14	3896	3988	4080	4172	4264	4356	4449	4541	4633	4725
15	4817	4909	5001	5093	5185	5277	5370	5462	5554	5646
16	5738	5830	5922	6014	6106	6198	6290	6383	6475	6567
17	6659	6751	6843	6935	7027	7119	7211	7303	7395	7487
18	7579	7671	7763	7856	7948	8040	8132	8224	8316	8408
19	8500	8592	8684	8776	8868	8960	9052	9144	9236	9328
4720	9420	9512	9604	9696	9788	9880	9972	0064	0156	0248
21	674 0340	0432	0524	0616	0708	0800	0892	0984	1076	1168
22	1260	1352	1444	1536	1628	1720	1812	1904	1996	2088
23	2179	2271	2363	2455	2547	2639	2731	2823	2915	3007
24	3099	3191	3283	3375	3467	3559	3650	3742	3834	3926
25	4018	4110	4202	4294	4386	4478	4570	4661	4753	4845
26	4937	5029	5121	5213	5305	5397	5489	5580	5672	5764
27	5856	5948	6040	6132	6224	6315	6407	6499	6591	6683
28	6775	6867	6958	7050	7142	7234	7326	7418	7509	7601
29	7693	7785	7877	7969	8060	8152	8244	8336	8428	8520
4730	8611	8703	8795	8887	8979	9070	9162	9254	9346	9438
31	9529	9621	9713	9805	9897	9988	0080	0172	0264	0356
32	675 0447	0539	0631	0723	0814	0906	0998	1090	1182	1273
33	1365	1457	1549	1640	1732	1824	1916	2007	2099	2191
34	2283	2374	2466	2558	2649	2741	2833	2925	3016	3108
35	3200	3292	3383	3475	3567	3658	3750	3842	3934	4025
36	4117	4209	4300	4392	4484	4575	4667	4759	4850	4942
37	5034	5126	5217	5309	5401	5492	5584	5676	5767	5859
38	5951	6042	6134	6226	6317	6409	6501	6592	6684	6775
39	6867	6959	7050	7142	7234	7325	7417	7509	7600	7692
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41	8700	8791	8883	8974	9066	9158	9249	9341	9432	9524
42	9615	9707	9799	9890	9982	0073	0165	0257	0348	0440
43	676 0531	0623	0714	0806	0897	0989	1081	1172	1264	1355
44	1447	1538	1630	1721	1813	1905	1996	2088	2179	2271
45	2362	2454	2545	2637	2728	2820	2911	3003	3094	3186
46	3277	3369	3460	3552	3643	3735	3826	3918	4009	4101
47	4192	4284	4375	4467	4558	4650	4741	4833	4924	5016
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49	6022	6113	6205	6296	6387	6479	6570	6662	6753	6845
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53	9678	9770	9861	9952	0̄044	0̄135	0̄226	0̄318	0̄409	0̄500
54	677 0592	0683	0774	0866	0957	1049	1140	1231	1323	1414
55	1505	1597	1688	1779	1871	1962	2053	2145	2236	2327
56	2418	2510	2601	2692	2784	2875	2966	3058	3149	3240
57	3332	3423	3514	3605	3697	3788	3879	3971	4062	4153
58	4244	4336	4427	4518	4609	4701	4792	4883	4975	5066
59	5157	5248	5340	5431	5522	5613	5705	5796	5887	5978
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61	6982	7073	7164	7255	7347	7438	7529	7620	7712	7803
62	7894	7985	8076	8168	8259	8350	8441	8532	8623	8715
63	8806	8897	8988	9079	9171	9262	9353	9444	9535	9626
64	9718	9809	9900	9991	0̄082	0̄173	0̄264	0̄356	0̄447	0̄538
65	678 0629	0720	0811	0902	0994	1085	1176	1267	1358	1449
66	1540	1632	1723	1814	1905	1996	2087	2178	2269	2360
67	2452	2543	2634	2725	2816	2907	2998	3089	3180	3271
68	3362	3454	3545	3636	3727	3818	3909	4000	4091	4182
69	4273	4364	4455	4546	4637	4729	4820	4911	5002	5093
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71	6094	6185	6276	6367	6458	6549	6640	6731	6822	6913
72	7004	7095	7186	7277	7368	7459	7550	7641	7732	7823
73	7914	8005	8096	8187	8278	8369	8460	8551	8642	8733
74	8824	8915	9006	9097	9188	9279	9370	9461	9552	9643
75	9734	9825	9916	0̄007	0̄098	0̄188	0̄279	0̄370	0̄461	0̄552
76	679 0643	0734	0825	0916	1007	1098	1189	1280	1371	1461
77	1552	1643	1734	1825	1916	2007	2098	2189	2280	2371
78	2461	2552	2643	2734	2825	2916	3007	3098	3189	3279
79	3370	3461	3552	3643	3734	3825	3916	4006	4097	4188
4780	4279	4370	4461	4552	4642	4733	4824	4915	5006	5097
81	5187	5278	5369	5460	5551	5642	5732	5823	5914	6005
82	6096	6187	6277	6368	6459	6550	6641	6731	6822	6913
83	7004	7095	7185	7276	7367	7458	7549	7639	7730	7821
84	7912	8002	8093	8184	8275	8366	8456	8547	8638	8729
85	8819	8910	9001	9092	9182	9273	9364	9455	9545	9636
86	9727	9818	9908	9999	0̄090	0̄181	0̄271	0̄362	0̄453	0̄544
87	680 0634	0725	0816	0906	0997	1088	1179	1269	1360	1451
88	1541	1632	1723	1814	1904	1995	2086	2176	2267	2358
89	2448	2539	2630	2720	2811	2902	2992	3083	3174	3264
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91	4262	4352	4443	4534	4624	4715	4806	4896	4987	5077
92	5168	5259	5349	5440	5531	5621	5712	5802	5893	5984
93	6074	6165	6256	6346	6437	6527	6618	6709	6799	6890
94	6980	7071	7161	7252	7343	7433	7524	7614	7705	7796
95	7886	7977	8067	8158	8248	8339	8430	8520	8611	8701
96	8792	8882	8973	9063	9154	9244	9335	9426	9516	9607
97	9697	9788	9878	9969	0̄059	0̄150	0̄240	0̄331	0̄421	0̄512
98	681 0602	0693	0783	0874	0964	1055	1145	1236	1327	1417
99	1507	1598	1688	1779	1869	1960	2050	2141	2231	2322
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P. P.

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01	3317	3408	3498	3588	3679	3769	3860	3950	4041	4131	
02	4222	4312	4402	4493	4583	4674	4764	4855̄	4945	5035	
03	5126	5216	5307	5397	5488	5578	5668	5759	5849	5940	
04	6030	6120	6211	6301	6392	6482	6572	6663	6753	6844	
05	6934	7024	7115̄	7205	7295	7386	7476	7567	7657	7747	
06	7838	7928	8018	8109	8199	8289	8380	8470	8561	8651	
07	8741	8832	8922	9012	9103	9193	9283	9374	9464	9554	91 1 9.1 2 18.2 3 27.3 4 36.4 5 45.5 6 54.6 7 63.7 8 72.8 9 81.9
08	9645̄	9735̄	9825	9916	0̄006	0̄096	0̄187	0̄277	0̄367	0̄457	
09	682 0548	0638	0728	0819	0909	0999	1090	1180	1270	1360	
4810	1451	1541	1631	1722	1812	1902	1992	2083	2173	2263	
11	2354	2444	2534	2624	2715̄	2805̄	2895	2985	3076	3166	
12	3256	3346	3437	3527	3617	3707	3798	3888	3978	4068	
13	4159	4249	4339	4429	4520	4610	4700	4790	4880	4971	
14	5061	5151	5241	5331	5422	5512	5602	5692	5783	5873	
15	5963	6053	6143	6233	6324	6414	6504	6594	6684	6775̄	
16	6865̄	6955̄	7045	7135	7225	7316	7406	7496	7586	7676	
17	7766	7857	7947	8037	8127	8217	8307	8398	8488	8578	
18	8668	8758	8848	8938	9029	9119	9209	9299	9389	9479	
19	9569	9659	9750	9840	9930	0̄020	0̄110	0̄200	0̄290	0̄380	
4820	683 0470	0560	0651	0741	0831	0921	1011	1101	1191	1281	
21	1371	1461	1551	1642	1732	1822	1912	2002	2092	2182	90 1 9.0 2 18.0 3 27.0 4 36.0 5 45.0 6 54.0 7 63.0 8 72.0 9 81.0
22	2272	2362	2452	2542	2632	2722	2812	2902	2993	3083	
23	3173	3263	3353	3443	3533	3623	3713	3803	3893	3983	
24	4073	4163	4253	4343	4433	4523	4613	4703	4793	4883	
25	4973	5063	5153	5243	5333	5423	5513	5603	5693	5783	
26	5873	5963	6053	6143	6233	6323	6413	6503	6593	6683	
27	6773	6863	6953	7043	7133	7223	7313	7403	7493	7583	
28	7673	7763	7853	7942	8032	8122	8212	8302	8392	8482	
29	8572	8662	8752	8842	8932	9022	9112	9202	9291	9381	
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31	684 0370	0460	0550	0640	0730	0820	0910	1000	1089	1179	
32	1269	1359	1449	1539	1629	1719	1808	1898	1988	2078	
33	2168	2258	2348	2438	2527	2617	2707	2797	2887	2977	
34	3066	3156	3246	3336	3426	3516	3605	3695	3785	3875̄	
35	3965̄	4055̄	4144	4234	4324	4414	4504	4594	4683	4773	
36	4863	4953	5043	5132	5222	5312	5402	5492	5581	5671	89 1 8.9 2 17.8 3 26.7 4 35.6 5 44.5 6 53.4 7 62.3 8 71.2 9 80.1
37	5761	5851	5940	6030	6120	6210	6300	6389	6479	6569	
38	6659	6748	6838	6928	7018	7107	7197	7287	7377	7466	
39	7556	7646	7736	7825	7915	8005̄	8095̄	8184	8274	8364	
4840	8454	8543	8633	8723	8813	8902	8992	9082	9171	9261	
41	9351	9441	9530	9620	9710	9799	9889	9979	0̄068	0̄158	
42	685 0248	0338	0427	0517	0607	0696	0786	0876	0965	1055	
43	1145̄	1234	1324	1414	1503	1593	1683	1772	1862	1952	
44	2041	2131	2221	2310	2400	2490	2579	2669	2759	2848	
45	2938	3027	3117	3207	3296	3386	3476	3565	3655̄	3744	
46	3834	3924	4013	4103	4193	4282	4372	4461	4551	4641	
47	4730	4820	4909	4999	5089	5178	5268	5357	5447	5537	
48	5626	5716	5805	5895̄	5984	6074	6164	6253	6343	6432	
49	6522	6611	6701	6791	6880	6970	7059	7149	7238	7328	
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51	8313	8402	8492	8581	8671	8760	8850	8939	9029	9118
52	9208	9297	9387	9476	9566	9655	9745̄	9834	9924	0̄013
53	686 0103	0192	0282	0371	0461	0550	0640	0729	0819	0908
54	0998	1087	1177	1266	1356	1445	1535̄	1624	1713	1803
55	1892	1982	2071	2161	2250	2340	2429	2518	2608	2697
56	2787	2876	2966	3055	3145̄	3234	3323	3413	3502	3592
57	3681	3770	3860	3949	4039	4128	4217	4307	4396	4486
58	4575	4665̄	4754	4843	4933	5022	5111	5201	5290	5380
59	5469	5558	5648	5737	5826	5916	6005	6095̄	6184	6273
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61	7256	7346	7435̄	7524	7614	7703	7792	7882	7971	8060
62	8150	8239	8328	8418	8507	8596	8685	8775̄	8864	8953
63	9043	9132	9221	9311	9400	9489	9578	9668	9757	9846
64	9936	0̄025̄	0̄114	0̄204	0̄293	0̄382	0̄471	0̄561	0̄650	0̄739
65	687 0828	0918	1007	1096	1186	1275̄	1364	1453	1543	1632
66	1721	1810	1900	1989	2078	2167	2257	2346	2435̄	2524
67	2613	2703	2792	2881	2970	3060	3149	3238	3327	3416
68	3506	3595̄	3684	3773	3863	3952	4041	4130	4219	4309
69	4398	4487	4576	4665	4755	4844	4933	5022	5111	5200
4870	5290	5379	5468	5557	5646	5735	5825̄	5914	6003	6092
71	6181	6270	6360	6449	6538	6627	6716	6805	6895̄	6984
72	7075	7162	7251	7340	7429	7518	7608	7697	7786	7875̄
73	7964	8053	8142	8231	8321	8410	8499	8588	8677	8766
74	8855	8944	9033	9123	9212	9301	9390	9479	9568	9657
75	9746	9835	9924	0̄013	0̄103	0̄192	0̄281	0̄370	0̄459	0̄548
76	688 0637	0726	0815	0904	0993	1082	1171	1260	1349	1439
77	1528	1617	1706	1795̄	1884	1973	2062	2151	2240	2329
78	2418	2507	2596	2685	2774	2863	2952	3041	3130	3219
79	3308	3397	3486	3575	3664	3753	3842	3931	4020	4109
4880	4198	4287	4376	4465	4554	4643	4732	4821	4910	4999
81	5088	5177	5266	5355̄	5444	5533	5622	5711	5800	5889
82	5978	6067	6156	6245̄	6334	6423	6511	6600	6689	6778
83	6867	6956	7045	7134	7223	7312	7401	7490	7579	7668
84	7757	7845	7934	8023	8112	8201	8290	8379	8468	8557
85	8646	8735̄	8823	8912	9001	9090	9179	9268	9357	9446
86	9535̄	9624	9712	9801	9890	9979	0̄068	0̄157	0̄246	0̄335̄
87	689 0423	0512	0601	0690	0779	0868	0957	1045	1134	1223
88	1312	1401	1490	1579	1667	1756	1845	1934	2023	2112
89	2200	2289	2378	2467	2556	2645̄	2733	2822	2911	3000
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91	3977	4065	4154	4243	4332	4421	4509	4598	4687	4776
92	4864	4953	5042	5131	5220	5308	5397	5486	5575̄	5663
93	5752	5841	5930	6018	6107	6196	6285̄	6373	6462	6551
94	6640	6728	6817	6906	6995̄	7083	7172	7261	7350	7438
95	7527	7616	7704	7793	7882	7971	8059	8148	8237	8325
96	8414	8503	8591	8680	8769	8858	8946	9035̄	9124	9212
97	9301	9390	9478	9567	9656	9744	9833	9922	0̄010	0̄099
98	690 0188	0276	0365	0454	0542	0631	0720	0808	0897	0986
99	1074	1163	1252	1340	1429	1518	1606	1695̄	1784	1872
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P. P.

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04	5505̄	5593	5682	5770	5859	5947	6036	6124	6213	6302	
05	6390	6479	6567	6656	6744	6833	6921	7010	7098	7187	
06	7275	7364	7452	7541	7630	7718	7807	7895	7984	8072	
07	8161	8249	8338	8426	8515̄	8603	8692	8780	8869	8957	89 1 8.9 2 17.8 3 26.7 4 35.6 5 44.5 6 53.4 7 62.3 8 71.2 9 80.1
08	9046	9134	9223	9311	9399	9488	9576	9665̄	9753	9842	
09	9930	0̄019	0̄107	0̄196	0̄284	0̄373	0̄461	0̄550	0̄638	0̄726	
4910	691 0815̄	0903	0992	1080	1169	1257	1346	1434	1522	1611	
11	1699	1788	1876	1965̄	2053	2141	2230	2318	2407	2495	
12	2584	2672	2760	2849	2937	3026	3114	3202	3291	3379	
13	3468	3556	3644	3733	3821	3910	3998	4086	4175̄	4263	
14	4352	4440	4528	4617	4705	4793	4882	4970	5058	5147	
15	5235	5324	5412	5500	5589	5677	5765	5854	5942	6030	
16	6119	6207	6295	6384	6472	6560	6649	6737	6825	6914	
17	7002	7090	7179	7267	7355	7444	7532	7620	7709	7797	
18	7885	7974	8062	8150	8238	8327	8415	8503	8592	8680	
19	8768	8857	8945̄	9033	9121	9210	9298	9386	9474	9563	
4920	9651	9739	9828	9916	0̄004	0̄092	0̄181	0̄269	0̄357	0̄445	
21	692 0534	0622	0710	0798	0887	0975̄	1063	1151	1240	1328	88 1 8.8 2 17.6 3 26.4 4 35.2 5 44.0 6 52.8 7 61.6 8 70.4 9 79.2
22	1416	1504	1593	1681	1769	1857	1945	2034	2122	2210	
23	2298	2387	2475̄	2563	2651	2739	2828	2916	3004	3092	
24	3180	3269	3357	3445	3533	3621	3710	3798	3886	3974	
25	4062	4151	4239	4327	4415	4503	4591	4680	4768	4856	
26	4944	5032	5120	5209	5297	5385̄	5473	5561	5649	5737	
27	5826	5914	6002	6090	6178	6266	6354	6443	6531	6619	
28	6707	6795	6883	6971	7059	7148	7236	7324	7412	7500	
29	7588	7676	7764	7853	7941	8029	8117	8205̄	8293	8381	
4930	8469	8557	8645	8733	8822	8910	8998	9086	9174	9262	
31	9350	9438	9526	9614	9702	9790	9878	9967	0̄055̄	0̄143	
32	693 0231	0319	0407	0495̄	0583	0671	0759	0847	0935	1023	
33	1111	1199	1287	1375	1463	1551	1639	1727	1815	1903	
34	1991	2079	2167	2256	2344	2432	2520	2608	2696	2784	
35	2872	2960	3048	3136	3224	3312	3400	3488	3576	3664	
36	3752	3839	3927	4015	4103	4191	4279	4367	4455	4543	
37	4631	4719	4807	4895	4983	5071	5159	5247	5335̄	5423	87 1 8.7 2 17.4 3 26.1 4 34.8 5 43.5 6 52.2 7 60.9 8 69.6 9 78.3
38	5511	5599	5687	5775̄	5863	5951	6039	6126	6214	6302	
39	6390	6478	6566	6654	6742	6830	6918	7006	7094	7182	
4940	7269	7357	7445	7533	7621	7709	7797	7885̄	7973	8061	
41	8149	8236	8324	8412	8500	8588	8676	8764	8852	8940	
42	9027	9115	9203	9291	9379	9467	9555̄	9643	9730	9818	
43	9906	9994	0̄082	0̄170	0̄258	0̄345	0̄433	0̄521	0̄609	0̄697	
44	694 0785̄	0872	0960	1048	1136	1224	1312	1399	1487	1575	
45	1663	1751	1839	1926	2014	2102	2190	2278	2366	2453	
46	2541	2629	2717	2805̄	2892	2980	3068	3156	3244	3331	
47	3419	3507	3595̄	3682	3770	3858	3946	4034	4121	4209	
48	4297	4385̄	4472	4560	4648	4736	4824	4911	4999	5087	
49	5175̄	5262	5350	5438	5526	5613	5701	5789	5877	5964	
4950	6052	6140	6227	6315	6403	6491	6578	6666	6754	6842	
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4950	694 6052	6140	6227	6315	6403	6491	6578	6666	6754	6842
51	6929	7017	7105̄	7192	7280	7368	7456	7543	7631	7719
52	7806	7894	7982	8069	8157	8245̄	8333	8420	8508	8596
53	8683	8771	8859	8946	9034	9122	9209	9297	9385̄	9472
54	9560	9648	9735	9823	9911	9998	0̄086	0̄174	0̄261	0̄349
55	695 0437	0524	0612	0700	0787	0875̄	0962	1050	1138	1225
56	1313	1401	1488	1576	1663	1751	1839	1926	2014	2102
57	2189	2277	2364	2452	2540	2627	2715̄	2802	2890	2978
58	3065	3153	3240	3328	3416	3503	3591	3678	3766	3854
59	3941	4029	4116	4204	4291	4379	4467	4554	4642	4729
4960	4817	4904	4992	5079	5167	5255̄	5342	5430	5517	5605̄
61	5692	5780	5867	5955̄	6042	6130	6217	6305	6393	6480
62	6568	6655	6743	6830	6918	7005	7093	7180	7268	7355
63	7443	7530	7618	7705	7793	7880	7968	8055	8143	8230
64	8318	8405	8493	8580	8668	8755	8843	8930	9018	9105
65	9193	9280	9367	9455̄	9542	9630	9717	9805̄	9892	9980
66	696 0067	0155̄	0242	0330	0417	0504	0592	0679	0767	0854
67	0942	1029	1116	1204	1291	1379	1466	1554	1641	1728
68	1816	1903	1991	2078	2166	2253	2340	2428	2515	2603
69	2690	2777	2865̄	2952	3040	3127	3214	3302	3389	3477
4970	3564	3651	3739	3826	3913	4001	4088	4176	4263	4350
71	4438	4525̄	4612	4700	4787	4874	4962	5049	5137	5224
72	5311	5399	5486	5573	5661	5748	5835	5923	6010	6097
73	6185̄	6272	6359	6447	6534	6621	6709	6796	6883	6970
74	7058	7145	7232	7320	7407	7494	7582	7669	7756	7844
75	7931	8018	8105	8193	8280	8367	8455̄	8542	8629	8716
76	8804	8891	8978	9066	9153	9240	9327	9415̄	9502	9589
77	9676	9764	9851	9938	0̄025	0̄113	0̄200	0̄287	0̄374	0̄462
78	697 0549	0636	0723	0811	0898	0985	1072	1160	1247	1334
79	1421	1508	1596	1683	1770	1857	1945̄	2032	2119	2206
4980	2293	2381	2468	2555	2642	2729	2817	2904	2991	3078
81	3165	3253	3340	3427	3514	3601	3689	3776	3863	3950
82	4037	4124	4212	4299	4386	4473	4560	4647	4735̄	4822
83	4909	4996	5083	5170	5257	5345̄	5432	5519	5606	5693
84	5780	5867	5955̄	6042	6129	6216	6303	6390	6477	6565̄
85	6652	6739	6826	6913	7000	7087	7174	7261	7349	7436
86	7523	7610	7697	7784	7871	7958	8045	8132	8220	8307
87	8394	8481	8568	8655̄	8742	8829	8916	9003	9090	9177
88	9264	9352	9439	9526	9613	9700	9787	9874	9961	0̄048
89	698 0135	0222	0309	0396	0483	0570	0657	0744	0831	0918
4990	1005	1092	1180	1267	1354	1441	1528	1615̄	1702	1789
91	1876	1963	2050	2137	2224	2311	2398	2485̄	2572	2659
92	2746	2833	2920	3007	3094	3181	3268	3355̄	3442	3529
93	3616	3703	3790	3877	3964	4051	4138	4224	4311	4398
94	4485	4572	4659	4746	4833	4920	5007	5094	5181	5268
95	5355̄	5442	5529	5616	5703	5790	5877	5964	6050	6137
96	6224	6311	6398	6485	6572	6659	6746	6833	6920	7007
97	7093	7180	7267	7354	7441	7528	7615̄	7702	7789	7876
98	7963	8049	8136	8223	8310	8397	8484	8571	8658	8744
99	8831	8918	9005	9092	9179	9266	9353	9439	9526	9613
5000	9700	9787	9874	9961	0̄047	0̄134	0̄221	0̄308	0̄395̄	0̄482
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P. P.

	88
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2	17.6
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5	44.0
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3	26.1
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7	60.9
8	69.6
9	78.3

	86
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2	17.2
3	25.8
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7	60.2
8	68.8
9	77.4

P. P.

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5000	698 9700	9787	9874	9961	0̄047	0̄134	0̄221	0̄308	0̄395̄	0̄482	
01	699 0569	0655	0742	0829	0916	1003	1090	1176	1263	1350	
02	1437	1524	1611	1697	1784	1871	1958	2045̄	2131	2218	
03	2305	2392	2479	2565	2652	2739	2826	2913	2999	3086	
04	3173	3260	3347	3433	3520	3607	3694	3780	3867	3954	
05	4041	4128	4214	4301	4388	4475̄	4561	4648	4735̄	4822	
06	4908	4995	5082	5169	5255	5342	5429	5516	5602	5689	
07	5776	5863	5949	6036	6123	6210	6296	6383	6470	6556	
08	6643	6730	6817	6903	6990	7077	7163	7250	7337	7424	
09	7510	7597	7684	7770	7857	7944	8031	8117	8204	8291	
5010	8377	8464	8551	8637	8724	8811	8897	8984	9071	9157	
11	9244	9331	9417	9504	9591	9677	9764	9851	9937	0̄024	87
12	700 0111	0197	0284	0371	0457	0544	0630	0717	0804	0890	1 8.7
13	0977	1064	1150	1237	1324	1410	1497	1583	1670	1757	2 17.4
14	1843	1930	2017	2103	2190	2276	2363	2450	2536	2623	3 26.1
15	2709	2796	2883	2969	3056	3142	3229	3316	3402	3489	4 34.8
16	3575	3662	3748	3835	3922	4008	4095̄	4181	4268	4354	5 43.5
17	4441	4528	4614	4701	4787	4874	4960	5047	5133	5220	6 52.2
18	5307	5393	5480	5566	5653	5739	5826	5912	5999	6085	7 60.9
19	6172	6258	6345	6432	6518	6605̄	6691	6778	6864	6951	8 69.6 9 78.3
5020	7037	7124	7210	7297	7383	7470	7556	7643	7729	7816	
21	7902	7989	8075	8162	8248	8335̄	8421	8508	8594	8681	
22	8767	8854	8940	9027	9113	9199	9286	9372	9459	9545	
23	9632	9718	9805̄	9891	9978	0̄064	0̄151	0̄237	0̄323	0̄410	
24	701 0496	0583	0669	0756	0842	0929	1015̄	1101	1188	1274	
25	1361	1447	1534	1620	1706	1793	1879	1966	2052	2138	
26	2225̄	2311	2398	2484	2570	2657	2743	2830	2916	3002	
27	3089	3175	3262	3348	3434	3521	3607	3694	3780	3866	
28	3953	4039	4125	4212	4298	4385̄	4471	4557	4644	4730	
29	4816	4903	4989	5075	5162	5248	5334	5421	5507	5594	
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31	6543	6629	6716	6802	6888	6975̄	7061	7147	7234	7320	86
32	7406	7493	7579	7665	7752	7838	7924	8010	8097	8183	1 8.6
33	8269	8356	8442	8528	8614	8701	8787	8873	8960	9046	2 17.2
34	9132	9218	9305̄	9391	9477	9563	9650	9736	9822	9908	3 25.8
35	9995̄	0̄081	0̄167	0̄254	0̄340	0̄426	0̄512	0̄598	0̄685̄	0̄771	4 34.4
36	702 0857	0943	1030	1116	1202	1288	1375̄	1461	1547	1633	5 43.0
37	1720	1806	1892	1978	2064	2151	2237	2323	2409	2495	6 51.6
38	2582	2668	2754	2840	2926	3013	3099	3185	3271	3357	7 60.2
39	3444	3530	3616	3702	3788	3874	3961	4047	4133	4219	8 68.8 9 77.4
5040	4305	4392	4478	4564	4650	4736	4822	4909	4995̄	5081	
41	5167	5253	5339	5425	5512	5598	5684	5770	5856	5942	
42	6028	6115̄	6201	6287	6373	6459	6545	6631	6717	6804	
43	6890	6976	7062	7148	7234	7320	7406	7492	7579	7665̄	
44	7751	7837	7923	8009	8095	8181	8267	8353	8440	8526	
45	8612	8698	8784	8870	8956	9042	9128	9214	9300	9386	
46	9472	9559	9645̄	9731	9817	9903	9989	0̄075̄	0̄161	0̄247	
47	703 0333	0419	0505	0591	0677	0763	0849	0935	1021	1107	
48	1193	1279	1366	1452	1538	1624	1710	1796	1882	1968	
49	2054	2140	2226	2312	2398	2484	2570	2656	2742	2828	
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5050	703 2914	3000	3086	3172	3258	3344	3430	3516	3602	3688	
51	3774	3860	3946	4032	4118	4204	4290	4376	4461	4547	
52	4633	4719	4805	4891	4977	5063	5149	5235	5321	5407	
53	5493	5579	5665̅	5751	5837	5923	6009	6095̅	6181	6266	
54	6352	6438	6524	6610	6696	6782	6868	6954	7040	7126	
55	7212	7298	7383	7469	7555	7641	7727	7813	7899	7985̅	
56	8071	8157	8242	8328	8414	8500	8586	8672	8758	8844	
57	8930	9015	9101	9187	9273	9359	9445̅	9531	9617	9702	
58	9788	9874	9960	0̅046	0̅132	0̅218	0̅303	0̅389	0̅475	0̅561	
59	704 0647	0733	0818	0904	0990	1076	1162	1248	1334	1419	
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61	2363	2449	2535̅	2621	2707	2792	2878	2964	3050	3136	86
62	3221	3307	3393	3479	3565̅	3650	3736	3822	3908	3993	1 8.6
63	4079	4165	4251	4337	4422	4508	4594	4680	4765	4851	2 17.2
64	4937	5023	5108	5194	5280	5366	5452	5537	5623	5709	3 25.8
65	5794	5880	5966	6052	6137	6223	6309	6395̅	6480	6566	4 34.4
66	6652	6738	6823	6909	6995̅	7080	7166	7252	7338	7423	5 43.0
67	7509	7595̅	7680	7766	7852	7938	8023	8109	8195̅	8280	6 51.6
68	8366	8452	8537	8623	8709	8795̅	8880	8966	9052	9137	7 60.2
69	9223	9309	9394	9480	9566	9651	9737	9823	9908	9994	8 68.8
5070	705 0080	0165	0251	0337	0422	0508	0594	0679	0765̅	0850	9 77.4
71	0936	1022	1107	1193	1279	1364	1450	1536	1621	1707	
72	1792	1878	1964	2049	2135̅	2221	2306	2392	2477	2563	
73	2649	2734	2820	2905	2991	3077	3162	3248	3333	3419	
74	3505̅	3590	3676	3761	3847	3933	4018	4104	4189	4275̅	
75	4360	4446	4532	4617	4703	4788	4874	4959	5045	5131	
76	5216	5302	5387	5473	5558	5644	5729	5815	5901	5986	
77	6072	6157	6243	6328	6414	6499	6585̅	6670	6756	6841	
78	6927	7012	7098	7184	7269	7355̅	7440	7526	7611	7697	
79	7782	7868	7953	8039	8124	8210	8295	8381	8466	8552	
5080	8637	8723	8808	8894	8979	9065̅	9150	9236	9321	9406	
81	9492	9577	9663	9748	9834	9919	0̅005̅	0̅090	0̅176	0̅261	85
82	706 0347	0432	0518	0603	0688	0774	0859	0945̅	1030	1116	1 8.5
83	1201	1287	1372	1457	1543	1628	1714	1799	1885̅	1970	2 17.0
84	2055	2141	2226	2312	2397	2483	2568	2653	2739	2824	3 25.5
85	2910	2995̅	3080	3166	3251	3337	3422	3507	3593	3678	4 34.0
86	3764	3849	3934	4020	4105	4190	4276	4361	4447	4532	5 42.5
87	4617	4703	4788	4873	4959	5044	5130	5215̅	5300	5386	6 51.0
88	5471	5556	5642	5727	5812	5898	5983	6068	6154	6239	7 59.5
89	6325̅	6410	6495	6581	6666	6751	6837	6922	7007	7092	8 68.0
5090	7178	7263	7348	7434	7519	7604	7690	7775	7860	7946	9 76.5
91	8031	8116	8202	8287	8372	8457	8543	8628	8713	8799	
92	8884	8969	9055̅	9140	9225	9310	9396	9481	9566	9651	
93	9737	9822	9907	9993	0̅078	0̅163	0̅248	0̅334	0̅419	0̅504	
94	707 0589	0675̅	0760	0845	0930	1016	1101	1186	1271	1357	
95	1442	1527	1612	1698	1783	1868	1953	2039	2124	2209	
96	2294	2379	2465̅	2550	2635	2720	2805	2891	2976	3061	
97	3146	3232	3317	3402	3487	3572	3658	3743	3828	3913	
98	3998	4083	4169	4254	4339	4424	4509	4595̅	4680	4765̅	
99	4850	4935	5020	5106	5191	5276	5361	5446	5531	5617	
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02	7405̄	7490	7575̄	7660	7745	7830	7915	8000	8085	8171	
03	8256	8341	8426	8511	8596	8681	8766	8851	8936	9022	
04	9107	9192	9277	9362	9447	9532	9617	9702	9787	9872	
05	9957	0̄043	0̄128	0̄213	0̄298	0̄383	0̄468	0̄553	0̄638	0̄723	
06	708 0808	0893	0978	1063	1148	1233	1318	1403	1488	1574	
07	1659	1744	1829	1914	1999	2084	2169	2254	2339	2424	
08	2509	2594	2679	2764	2849	2934	3019	3104	3189	3274	
09	3359	3444	3529	3614	3699	3784	3869	3954	4039	4124	
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11	5059	5144	5229	5314	5399	5484	5569	5654	5739	5823	
12	5908	5993	6078	6163	6248	6333	6418	6503	6588	6673	
13	6758	6843	6928	7013	7098	7183	7268	7352	7437	7522	
14	7607	7692	7777	7862	7947	8032	8117	8202	8287	8371	
15	8456	8541	8626	8711	8796	8881	8966	9051	9136	9220	
16	9305	9390	9475	9560	9645̄	9730	9815̄	9900	9984	0̄069	
17	709 0154	0239	0324	0409	0494	0579	0663	0748	0833	0918	
18	1003	1088	1173	1257	1342	1427	1512	1597	1682	1766	
19	1851	1936	2021	2106	2191	2275	2360	2445	2530	2615̄	
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21	3548	3633	3717	3802	3887	3972	4057	4141	4226	4311	
22	4396	4481	4565	4650	4735̄	4820	4904	4989	5074	5159	
23	5244	5328	5413	5498	5583	5667	5752	5837	5922	6006	
24	6091	6176	6261	6345	6430	6515̄	6600	6684	6769	6854	
25	6939	7023	7108	7193	7278	7362	7447	7532	7617	7701	
26	7786	7871	7955	8040	8125̄	8210	8294	8379	8464	8548	
27	8633	8718	8803	8887	8972	9057	9141	9226	9311	9395	
28	9480	9565̄	9650	9734	9819	9904	9988	0̄073	0̄158	0̄242	
29	710 0327	0412	0496	0581	0666	0750	0835	0920	1004	1089	
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31	2020	2105̄	2189	2274	2359	2443	2528	2613	2697	2782	
32	2866	2951	3036	3120	3205̄	3290	3374	3459	3543	3628	
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35	5404	5489	5574	5658	5743	5827	5912	5996	6081	6166	
36	6250	6335̄	6419	6504	6588	6673	6757	6842	6927	7011	
37	7096	7180	7265̄	7349	7434	7518	7603	7687	7772	7856	
38	7941	8026	8110	8195̄	8279	8364	8448	8533	8617	8702	
39	8786	8871	8955	9040	9124	9209	9293	9378	9462	9547	
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41	711 0476	0561	0645̄	0729	0814	0898	0983	1067	1152	1236	
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44	3010	3094	3178	3263	3347	3432	3516	3601	3685̄	3769	
45	3854	3938	4023	4107	4191	4276	4360	4445̄	4529	4613	
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47	5542	5626	5710	5795̄	5879	5964	6048	6132	6217	6301	
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53	712 0601	0686	0770	0854	0939	1023	1107	1191	1276	1360	
54	1444	1528	1613	1697	1781	1865	1950	2034	2118	2202	
55	2287	2371	2455	2539	2624	2708	2792	2876	2961	3045̄	
56	3129	3213	3298	3382	3466	3550	3634	3719	3803	3887	
57	3971	4056	4140	4224	4308	4392	4477	4561	4645̄	4729	85 1 8.5 2 17.0 3 25.5 4 34.0 5 42.5 6 51.0 7 59.5 8 68.0 9 76.5
58	4813	4898	4982	5066	5150	5234	5319	5403	5487	5571	
59	5655	5739	5824	5908	5992	6076	6160	6245̄	6329	6413	
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61	7339	7423	7507	7591	7675	7759	7843	7928	8012	8096	
62	8180	8264	8348	8432	8517	8601	8685̄	8769	8853	8937	
63	9021	9105	9189	9274	9358	9442	9526	9610	9694	9778	
64	9862	9946	0̄031	0̄115̄	0̄199	0̄283	0̄367	0̄451	0̄535	0̄619	
65	713 0703	0787	0871	0956	1040	1124	1208	1292	1376	1460	
66	1544	1628	1712	1796	1880	1964	2048	2132	2217	2301	
67	2385̄	2469	2553	2637	2721	2805̄	2889	2973	3057	3141	
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71	5745	5829	5913	5997	6081	6165	6249	6333	6417	6501	84 1 8.4 2 16.8 3 25.2 4 33.6 5 42.0 6 50.4 7 58.8 8 67.2 9 75.6
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76	9943	0̄027	0̄110	0̄194	0̄278	0̄362	0̄446	0̄530	0̄614	0̄698	
77	714 0782	0866	0949	1033	1117	1201	1285̄	1369	1453	1537	
78	1620	1704	1788	1872	1956	2040	2124	2208	2291	2375	
79	2459	2543	2627	2711	2795̄	2878	2962	3046	3130	3214	
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81	4136	4220	4304	4387	4471	4555	4639	4723	4806	4890	
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83	5812	5896	5980	6063	6147	6231	6315̄	6399	6482	6566	
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85	7488	7571	7655	7739	7823	7906	7990	8074	8158	8241	
86	8325	8409	8493	8576	8660	8744	8828	8911	8995	9079	
87	9162	9246	9330	9414	9497	9581	9665̄	9749	9832	9916	83 1 8.3 2 16.6 3 24.9 4 33.2 5 41.5 6 49.8 7 58.1 8 66.4 9 74.7
88	715 0000	0083	0167	0251	0335̄	0418	0502	0586	0669	0753	
89	0837	0920	1004	1088	1171	1255	1339	1423	1506	1590	
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92	3347	3430	3514	3598	3681	3765	3849	3932	4016	4100	
93	4183	4267	4350	4434	4518	4601	4685̄	4769	4852	4936	
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95	5856	5939	6023	6106	6190	6273	6357	6441	6524	6608	
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97	7527	7611	7694	7778	7861	7945̄	8029	8112	8196	8279	
98	8363	8446	8530	8613	8697	8780	8864	8948	9031	9115̄	
99	9198	9282	9365	9449	9532	9616	9699	9783	9866	9950	
5200	716 0033	0117	0200	0284	0367	0451	0535̄	0618	0702	0785	
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02	1703	1787	1870	1954	2037	2121	2204	2288	2371	2455	
03	2538	2622	2705	2789	2872	2956	3039	3123	3206	3289	
04	3373	3456	3540	3623	3707	3790	3874	3957	4040	4124	
05	4207	4291	4374	4458	4541	4625	4708	4791	4875	4958	
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12	717 0044	0127	0211	0294	0377	0461	0544	0627	0711	0794	
13	0877	0961	1044	1127	1210	1294	1377	1460	1544	1627	
14	1710	1794	1877	1960	2043	2127	2210	2293	2377	2460	
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26	1694	1777	1860	1943	2026	2110	2193	2276	2359	2442	
27	2525	2608	2691	2774	2857	2940	3023	3107	3190	3273	
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46	8283	8366	8448	8531	8614	8697	8780	8862	8945	9028	
47	9111	9193	9276	9359	9442	9524	9607	9690	9773	9856	
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49	720 0766	0848	0931	1014	1097	1179	1262	1345	1428	1510	
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5250 — 5300

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54	4901	4983	5066	5149	5231	5314	5397	5479	5562	564̄5	
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56	6554	6636	6719	6801	6884	6967	7049	7132	721̄5	7297	
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58	8206	8288	8371	8454	8536	8619	8701	8784	8867	8949	
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64	3159	3241	3324	3406	3489	3571	3654	3736	3819	3901	
65	3984	4066	4149	4231	4314	4396	4479	4561	4644	4726	
66	4809	4891	4973	5056	5138	5221	5303	5386	5468	5551	
67	5633	5716	5798	5881	5963	6045	6128	6210	6293	6375	
68	6458	6540	6623	670̄5	6787	6870	6952	703̄5	7117	7200	
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5270	8106	8189	8271	8353	8436	8518	8601	8683	8765	8848	
71	8930	9013	909̄5	9177	9260	9342	9424	9507	9589	9672	82 1 8.2 2 16.4 3 24.6 4 32.8 5 41.0 6 49.2 7 57.4 8 65.6 9 73.8
72	9754	9836	9919	0̄001	0̄084	0̄166	0̄248	0̄331	0̄413	0̄495	
73	722 0578	0660	0742	082̄5	0907	0990	1072	1154	1237	1319	
74	1401	1484	1566	1648	1731	1813	1895	1978	2060	2142	
75	222̄5	2307	2389	2472	2554	2636	2719	2801	2883	2966	
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77	3871	3953	4036	4118	4200	4282	436̄5	4447	4529	4612	
78	4694	4776	4858	4941	5023	5105	5188	5270	5352	5434	
79	5517	5599	5681	5763	5846	5928	6010	6092	617̄5	6257	
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81	7162	7244	7326	7408	7491	7573	7655	7737	7820	7902	
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83	8806	8888	8971	9053	913̄5	9217	9299	9382	9464	9546	
84	9628	9710	9792	987̄5	9957	0̄039	0̄121	0̄203	0̄286	0̄368	
85	723 0450	0532	0614	0696	0779	0861	0943	1025	1107	1189	
86	1272	1354	1436	1518	1600	1682	176̄5	1847	1929	2011	81 1 8.1 2 16.2 3 24.3 4 32.4 5 40.5 6 48.6 7 56.7 8 64.8 9 72.9
87	2093	2175	2257	2340	2422	2504	2586	2668	2750	2832	
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89	3736	3818	3900	3982	4064	4146	4228	4310	4393	447̄5	
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91	5378	5460	5542	5624	5706	5788	5870	5952	6034	6116	
92	6198	6280	6362	644̄5	6527	6609	6691	6773	685̄5	6937	
93	7019	7101	7183	7265	7347	7429	7511	7593	7675	7757	
94	7839	7921	8003	8085	8167	8250	8332	8414	8496	8578	
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96	9480	9562	9644	9726	9808	9890	9972	0̄054	0̄136	0̄218	
97	724 0300	0382	0464	0546	0628	0710	0792	0874	0956	1038	
98	1120	1202	1283	1365	1447	1529	1611	1693	1775	1857	
99	1939	2021	2103	2185	2267	2349	2431	2513	259̄5	2677	
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02	4397	4479	4561	4643	4725̄	4807	4889	4971	5052	5134	
03	5216	5298	5380	5462	5544	5626	5708	5790	5871	5953	
04	6035	6117	6199	6281	6363	6445̄	6526	6608	6690	6772	
05	6854	6936	7018	7099	7181	7263	7345	7427	7509	7591	
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09	725 0127	0209	0291	0373	0454	0536	0618	0700	0782	0863	
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11	1763	1845̄	1927	2008	2090	2172	2254	2335	2417	2499	82 1 8.2 2 16.4 3 24.6 4 32.8 5 41.0 6 49.2 7 57.4 8 65.6 9 73.8
12	2581	2662	2744	2826	2908	2989	3071	3153	3235̄	3316	
13	3398	3480	3562	3643	3725	3807	3889	3970	4052	4134	
14	4216	4297	4379	4461	4542	4624	4706	4788	4869	4951	
15	5033	5114	5196	5278	5360	5441	5523	5605̄	5686	5768	
16	5850	5931	6013	6095̄	6176	6258	6340	6422	6503	6585̄	
17	6667	6748	6830	6912	6993	7075̄	7157	7238	7320	7402	
18	7483	7565̄	7647	7728	7810	7892	7973	8055̄	8137	8218	
19	8300	8382	8463	8545̄	8626	8708	8790	8871	8953	9035̄	
5320	9116	9198	9280	9361	9443	9524	9606	9688	9769	9851	
21	9933	0̄014	0̄096	0̄177	0̄259	0̄341	0̄422	0̄504	0̄585	0̄667	
22	726 0749	0830	0912	0994	1075	1157	1238	1320	1401	1483	
23	1565̄	1646	1728	1809	1891	1973	2054	2136	2217	2299	
24	2380	2462	2544	2625	2707	2788	2870	2951	3033	3115̄	
25	3196	3278	3359	3441	3522	3604	3685	3767	3849	3930	
26	4012	4093	4175̄	4256	4338	4419	4501	4582	4664	4745	
27	4827	4908	4990	5072	5153	5235̄	5316	5398	5479	5561	
28	5642	5724	5805	5887	5968	6050	6131	6213	6294	6376	
29	6457	6539	6620	6702	6783	6865̄	6946	7028	7109	7191	
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31	8087	8168	8250	8331	8413	8494	8576	8657	8739	8820	81 1 8.1 2 16.2 3 24.3 4 32.4 5 40.5 6 48.6 7 56.7 8 64.8 9 72.9
32	8901	8983	9064	9146	9227	9309	9390	9472	9553	9634	
33	9716	9797	9879	9960	0̄042	0̄123	0̄204	0̄286	0̄367	0̄449	
34	727 0530	0612	0693	0774	0856	0937	1019	1100	1181	1263	
35	1344	1426	1507	1588	1670	1751	1833	1914	1995	2077	
36	2158	2240	2321	2402	2484	2565	2647	2728	2809	2891	
37	2972	3053	3135̄	3216	3298	3379	3460	3542	3623	3704	
38	3786	3867	3948	4030	4111	4192	4274	4355	4437	4518	
39	4599	4681	4762	4843	4925̄	5006	5087	5169	5250	5331	
5340	5413	5494	5575	5657	5738	5819	5901	5982	6063	6144	
41	6226	6307	6388	6470	6551	6632	6714	6795̄	6876	6958	
42	7039	7120	7201	7283	7364	7445	7527	7608	7689	7770	
43	7852	7933	8014	8096	8177	8258	8339	8421	8502	8583	
44	8664	8746	8827	8908	8990	9071	9152	9233	9315̄	9396	
45	9477	9558	9640	9721	9802	9883	9965̄	0̄046	0̄127	0̄208	
46	728 0290	0371	0452	0533	0614	0696	0777	0858	0939	1021	
47	1102	1183	1264	1346	1427	1508	1589	1670	1752	1833	
48	1914	1995	2076	2158	2239	2320	2401	2482	2564	2645̄	
49	2726	2807	2888	2970	3051	3132	3213	3294	3375	3457	
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5350	728 3538	3619	3700	3781	3863	3944	4025̄	4106	4187	4268	
51	4350	4431	4512	4593	4674	4755	4836	4918	4999	5080	
52	5161	5242	5323	5404	5486	5567	5648	5729	5810	5891	
53	5972	6054	6135̄	6216	6297	6378	6459	6540	6621	6703	
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57	9216	9298	9379	9460	9541	9622	9703	9784	9865̄	9946	
58	729 0027	0108	0189	0270	0351	0432	0513	0594	0675	0757	
59	0838	0919	1000	1081	1162	1243	1324	1405̄	1486	1567	
5360	1648	1729	1810	1891	1972	2053	2134	2215	2296	2377	
61	2458	2539	2620	2701	2782	2863	2944	3025	3106	3187	81 1 8.1 2 16.2 3 24.3 4 32.4 5 40.5 6 48.6 7 56.7 8 64.8 9 72.9
62	3268	3349	3430	3511	3592	3673	3754	3835	3916	3997	
63	4078	4159	4240	4321	4402	4483	4564	4645̄	4726	4807	
64	4888	4969	5050	5131	5212	5292	5373	5454	5535	5616	
65	5697	5778	5859	5940	6021	6102	6183	6264	6345̄	6426	
66	6507	6588	6669	6749	6830	6911	6992	7073	7154	7235	
67	7316	7397	7478	7559	7640	7721	7801	7882	7963	8044	
68	8125	8206	8287	8368	8449	8530	8610	8691	8772	8853	
69	8934	9015̄	9096	9177	9258	9338	9419	9500	9581	9662	
5370	9743	9824	9905̄	9985	0̄066	0̄147	0̄228	0̄309	0̄390	0̄471	
71	730 0552	0632	0713	0794	0875	0956	1037	1118	1198	1279	
72	1360	1441	1522	1603	1683	1764	1845	1926	2007	2088	
73	2168	2249	2330	2411	2492	2573	2653	2734	2815̄	2896	
74	2977	3057	3138	3219	3300	3381	3461	3542	3623	3704	
75	3785̄	3865	3946	4027	4108	4189	4269	4350	4431	4512	
76	4593	4673	4754	4835̄	4916	4997	5077	5158	5239	5320	
77	5400	5481	5562	5643	5723	5804	5885̄	5966	6046	6127	
78	6208	6289	6369	6450	6531	6612	6692	6773	6854	6935̄	
79	7015	7096	7177	7258	7338	7419	7500	7581	7661	7742	
5380	7823	7903	7984	8065̄	8146	8226	8307	8388	8468	8549	
81	8630	8711	8791	8872	8953	9033	9114	9195̄	9276	9356	80 1 8.0 2 16.0 3 24.0 4 32.0 5 40.0 6 48.0 7 56.0 8 64.0 9 72.0
82	9437	9518	9598	9679	9760	9840	9921	0̄002	0̄082	0̄163	
83	731 0244	0324	0405	0486	0567	0647	0728	0809	0889	0970	
84	1051	1131	1212	1292	1373	1454	1534	1615	1696	1776	
85	1857	1938	2018	2099	2180	2260	2341	2422	2502	2583	
86	2663	2744	2825̄	2905	2986	3067	3147	3228	3309	3389	
87	3470	3550	3631	3712	3792	3873	3953	4034	4115̄	4195	
88	4276	4356	4437	4518	4598	4679	4759	4840	4921	5001	
89	5082	5162	5243	5324	5404	5485̄	5565	5646	5727	5807	
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91	6693	6774	6854	6935̄	7016	7096	7177	7257	7338	7418	
92	7499	7579	7660	7740	7821	7902	7982	8063	8143	8224	
93	8304	8385̄	8465	8546	8626	8707	8787	8868	8948	9029	
94	9109	9190	9270	9351	9431	9512	9592	9673	9753	9834	
95	9914	9995̄	0̄075	0̄156	0̄236	0̄317	0̄397	0̄478	0̄558	0̄639	
96	732 0719	0800	0880	0961	1041	1122	1202	1283	1363	1444	
97	1524	1605̄	1685	1766	1846	1927	2007	2087	2168	2248	
98	2329	2409	2490	2570	2651	2731	2812	2892	2972	3053	
99	3133	3214	3294	3375̄	3455	3535	3616	3696	3777	3857	
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02	5546	5626	5707	5787	5867	5948	6028	6109	6189	6269	
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04	7153	7234	7314	7394	7475̄	7555	7636	7716	7796	7877	
05	7957	8037	8118	8198	8278	8359	8439	8519	8600	8680	
06	8760	8841	8921	9001	9082	9162	9242	9323	9403	9483	
07	9564	9644	9724	9805̄	9885̄	9965	0̄046	0̄126	0̄206	0̄287	81 1 8.1 2 16.2 3 24.3 4 32.4 5 40.5 6 48.6 7 56.7 8 64.8 9 72.9
08	733 0367	0447	0527	0608	0688	0768	0849	0929	1009	1090	
09	1170	1250	1330	1411	1491	1571	1652	1732	1812	1892	
5410	1973	2053	2133	2213	2294	2374	2454	2535̄	2615̄	2695	
11	2775	2856	2936	3016	3096	3177	3257	3337	3417	3498	
12	3578	3658	3738	3819	3899	3979	4059	4140	4220	4300	
13	4380	4461	4541	4621	4701	4781	4862	4942	5022	5102	
14	5183	5263	5343	5423	5503	5584	5664	5744	5824	5904	
15	5985̄	6065̄	6145	6225	6305	6386	6466	6546	6626	6706	
16	6787	6867	6947	7027	7107	7187	7268	7348	7428	7508	
17	7588	7669	7749	7829	7909	7989	8069	8150	8230	8310	
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19	9192	9272	9352	9432	9512	9592	9672	9752	9833	9913	
5420	9993	0̄073	0̄153	0̄233	0̄313	0̄393	0̄474	0̄554	0̄634	0̄714	
21	734 0794	0874	0954	1034	1115̄	1195̄	1275̄	1355̄	1435̄	1515	80 1 8.0 2 16.0 3 24.0 4 32.0 5 40.0 6 48.0 7 56.0 8 64.0 9 72.0
22	1595	1675	1755	1835	1916	1996	2076	2156	2236	2316	
23	2396	2476	2556	2636	2716	2796	2877	2957	3037	3117	
24	3197	3277	3357	3437	3517	3597	3677	3757	3837	3917	
25	3997	4077	4158	4238	4318	4398	4478	4558	4638	4718	
26	4798	4878	4958	5038	5118	5198	5278	5358	5438	5518	
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32	9598	9678	9758	9837	9917	9997	0̄077	0̄157	0̄237	0̄317	
33	735 0397	0477	0557	0637	0717	0797	0877	0957	1036	1116	
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35	1995	2075	2155	2235	2315	2395	2475̄	2555̄	2635̄	2715̄	
36	2794	2874	2954	3034	3114	3194	3274	3354	3434	3513	79 1 7.9 2 15.8 3 23.7 4 31.6 5 39.5 6 47.4 7 55.3 8 63.2 9 71.1
37	3593	3673	3753	3833	3913	3993	4073	4152	4232	4312	
38	4392	4472	4552	4632	4711	4791	4871	4951	5031	5111	
39	5191	5270	5350	5430	5510	5590	5670	5749	5829	5909	
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41	6787	6867	6947	7027	7107	7186	7266	7346	7426	7506	
42	7585	7665	7745̄	7825̄	7905̄	7984	8064	8144	8224	8304	
43	8383	8463	8543	8623	8702	8782	8862	8942	9022	9101	
44	9181	9261	9341	9420	9500	9580	9660	9740	9819	9899	
45	9979	0̄059	0̄138	0̄218	0̄298	0̄378	0̄457	0̄537	0̄617	0̄697	
46	736 0776	0856	0936	1016	1095	1175	1255̄	1335̄	1414	1494	
47	1574	1653	1733	1813	1893	1972	2052	2132	2212	2291	
48	2371	2451	2530	2610	2690	2770	2849	2929	3009	3088	
49	3168	3248	3327	3407	3487	3567	3646	3726	3806	3885	
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53	6355	6435	6514	6594	6674	6753	6833	6912	6992	7072
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55	7948	8027	8107	8186	8266	8346	8425	8505	8584	8664
56	8744	8823	8903	8982	9062	9142	9221	9301	9380	9460
57	9540	9619	9699	9778	9858	9937	0017	0097	0176	0256
58	737 0335	0415	0494	0574	0654	0733	0813	0892	0972	1051
59	1131	1210	1290	1370	1449	1529	1608	1688	1767	1847
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61	2722	2801	2881	2960	3040	3119	3199	3278	3358	3437
62	3517	3596	3676	3755	3835	3914	3994	4074	4153	4233
63	4312	4392	4471	4550	4630	4709	4789	4868	4948	5027
64	5107	5186	5266	5345	5425	5504	5584	5663	5743	5822
65	5902	5981	6061	6140	6220	6299	6378	6458	6537	6617
66	6696	6776	6855	6935	7014	7094	7173	7252	7332	7411
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68	8285	8364	8444	8523	8603	8682	8762	8841	8920	9000
69	9079	9159	9238	9317	9397	9476	9556	9635	9714	9794
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71	738 0667	0747	0826	0905	0985	1064	1143	1223	1302	1382
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73	2254	2334	2413	2493	2572	2651	2731	2810	2889	2969
74	3048	3127	3207	3286	3365	3445	3524	3603	3683	3762
75	3841	3921	4000	4079	4159	4238	4317	4396	4476	4555
76	4634	4714	4793	4872	4952	5031	5110	5190	5269	5348
77	5427	5507	5586	5665	5745	5824	5903	5982	6062	6141
78	6220	6300	6379	6458	6537	6617	6696	6775	6854	6934
79	7013	7092	7172	7251	7330	7409	7489	7568	7647	7726
5480	7806	7885	7964	8043	8123	8202	8281	8360	8440	8519
81	8598	8677	8756	8836	8915	8994	9073	9153	9232	9311
82	9390	9470	9549	9628	9707	9786	9866	9945	0024	0103
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84	0974	1054	1133	1212	1291	1370	1450	1529	1608	1687
85	1766	1845	1925	2004	2083	2162	2241	2321	2400	2479
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87	3350	3429	3508	3587	3666	3745	3824	3904	3983	4062
88	4141	4220	4299	4378	4458	4537	4616	4695	4774	4853
89	4932	5011	5091	5170	5249	5328	5407	5486	5565	5644
5490	5723	5803	5882	5961	6040	6119	6198	6277	6356	6435
91	6514	6594	6673	6752	6831	6910	6989	7068	7147	7226
92	7305	7384	7463	7543	7622	7701	7780	7859	7938	8017
93	8096	8175	8254	8333	8412	8491	8570	8649	8728	8808
94	8887	8966	9045	9124	9203	9282	9361	9440	9519	9598
95	9677	9756	9835	9914	9993	0072	0151	0230	0309	0388
96	740 0467	0546	0625	0704	0783	0862	0941	1020	1099	1178
97	1257	1336	1415	1494	1573	1652	1731	1810	1889	1968
98	2047	2126	2205	2284	2363	2442	2521	2600	2679	2758
99	2837	2916	2995	3074	3153	3232	3311	3390	3469	3548
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9	72.0

	79
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3	23.7
4	31.6
5	39.5
6	47.4
7	55.3
8	63.2
9	71.1

P. P.

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5500	740 3627	3706	3785̄	3864	3943	4022	4101	4180	4259	4338	
01	4416	4495	4574	4653	4732	4811	4890	4969	5048	5127	
02	5206	5285̄	5364	5443	5522	5601	5679	5758	5837	5916	
03	5995	6074	6153	6232	6311	6390	6469	6548	6626	6705	
04	6784	6863	6942	7021	7100	7179	7258	7337	7415	7494	
05	7573	7652	7731	7810	7889	7968	8047	8125	8204	8283	
06	8362	8441	8520	8599	8678	8756	8835	8914	8993	9072	
07	9151	9230	9308	9387	9466	9545	9624	9703	9782	9860	
08	9939	0̄018	0̄097	0̄176	0̄255̄	0̄334	0̄412	0̄491	0̄570	0̄649	
09	741 0728	0807	0885	0964	1043	1122	1201	1280	1358	1437	
5510	1516	1595̄	1674	1752	1831	1910	1989	2068	2146	2225	
11	2304	2383	2462	2541	2619	2698	2777	2856	2935̄	3013	79
12	3092	3171	3250	3328	3407	3486	3565̄	3644	3722	3801	1 7.9
13	3880	3959	4037	4116	4195	4274	4353	4431	4510	4589	2 15.8
14	4668	4746	4825	4904	4983	5061	5140	5219	5298	5376	3 23.7
15	5455	5534	5613	5691	5770	5849	5928	6006	6085	6164	4 31.6
16	6243	6321	6400	6479	6557	6636	6715̄	6794	6872	6951	5 39.5 6 47.4
17	7030	7109	7187	7266	7345̄	7423	7502	7581	7660	7738	7 55.3
18	7817	7896	7974	8053	8132	8210	8289	8368	8447	8525	8 63.2
19	8604	8683	8761	8840	8919	8997	9076	9155̄	9233	9312	9 71.1
5520	9391	9469	9548	9627	9705	9784	9863	9941	0̄020	0̄099	
21	742 0177	0256	0335̄	0413	0492	0571	0649	0728	0807	0885	
22	0964	1043	1121	1200	1279	1357	1436	1515̄	1593	1672	
23	1750	1829	1908	1986	2065̄	2144	2222	2301	2379	2458	
24	2537	2615	2694	2773	2851	2930	3008	3087	3166	3244	
25	3323	3401	3480	3559	3637	3716	3794	3873	3952	4030	
26	4109	4187	4266	4345̄	4423	4502	4580	4659	4737	4816	
27	4895̄	4973	5052	5130	5209	5288	5366	5445̄	5523	5602	
28	5680	5759	5837	5916	5995̄	6073	6152	6230	6309	6387	
29	6466	6544	6623	6702	6780	6859	6937	7016	7094	7173	
5530	7251	7330	7408	7487	7565	7644	7722	7801	7880	7958	
31	8037	8115	8194	8272	8351	8429	8508	8586	8665̄	8743	78
32	8822	8900	8979	9057	9136	9214	9293	9371	9450	9528	1 7.8
33	9607	9685	9764	9842	9921	9999	0̄078	0̄156	0̄235̄	0̄313	2 15.6
34	743 0392	0470	0549	0627	0705	0784	0862	0941	1019	1098	3 23.4 4 31.2
35	1176	1255̄	1333	1412	1490	1569	1647	1725	1804	1882	5 39.0
36	1961	2039	2118	2196	2275̄	2353	2431	2510	2588	2667	6 46.8
37	2745	2824	2902	2981	3059	3137	3216	3294	3373	3451	7 54.6
38	3530	3608	3686	3765̄	3843	3922	4000	4078	4157	4235	8 62.4
39	4314	4392	4470	4549	4627	4706	4784	4862	4941	5019	9 70.2
5540	5098	5176	5254	5333	5411	5490	5568	5646	5725̄	5803	
41	5882	5960	6038	6117	6195	6273	6352	6430	6508	6587	
42	6665	6744	6822	6900	6979	7057	7135	7214	7292	7370	
43	7449	7527	7605	7684	7762	7841	7919	7997	8076	8154	
44	8232	8311	8389	8467	8546	8624	8702	8781	8859	8937	
45	9016	9094	9172	9250	9329	9407	9485	9564	9642	9720	
46	9799	9877	9955	0̄034	0̄112	0̄190	0̄268	0̄347	0̄425	0̄503	
47	744 0582	0660	0738	0817	0895̄	0973	1051	1130	1208	1286	
48	1365̄	1443	1521	1599	1678	1756	1834	1912	1991	2069	
49	2147	2226	2304	2382	2460	2539	2617	2695	2773	2852	
5550	2930	3008	3086	3165̄	3243	3321	3399	3478	3556	3634	
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5550	744 2930	3008	3086	3165	3243	3321	3399	3478	3556	3634	
51	3712	3791	3869	3947	4025	4103	4182	4260	4338	4416	
52	4495	4573	4651	4729	4807	4886	4964	5042	5120	5199	
53	5277	5355	5433	5511	5590	5668	5746	5824	5902	5981	
54	6059	6137	6215	6293	6372	6450	6528	6606	6684	6762	
55	6841	6919	6997	7075	7153	7232	7310	7388	7466	7544	
56	7622	7701	7779	7857	7935	8013	8091	8170	8248	8326	
57	8404	8482	8560	8638	8717	8795	8873	8951	9029	9107	
58	9185	9264	9342	9420	9498	9576	9654	9732	9810	9889	
59	9967	0045	0123	0201	0279	0357	0435	0514	0592	0670	
5560	745 0748	0826	0904	0982	1060	1138	1217	1295	1373	1451	
61	1529	1607	1685	1763	1841	1919	1998	2076	2154	2232	78
62	2310	2388	2466	2544	2622	2700	2778	2856	2934	3013	1 7.8
63	3091	3169	3247	3325	3403	3481	3559	3637	3715	3793	2 15.6
64	3871	3949	4027	4105	4183	4261	4340	4418	4496	4574	3 23.4
65	4652	4730	4808	4886	4964	5042	5120	5198	5276	5354	4 31.2
66	5432	5510	5588	5666	5744	5822	5900	5978	6056	6134	5 39.0 6 46.8
67	6212	6290	6368	6446	6524	6602	6680	6758	6836	6914	7 54.6
68	6992	7070	7148	7226	7304	7382	7460	7538	7616	7694	8 62.4
69	7772	7850	7928	8006	8084	8162	8240	8318	8396	8474	9 70.2
5570	8552	8630	8708	8786	8864	8942	9020	9098	9176	9254	
71	9332	9410	9487	9565	9643	9721	9799	9877	9955	0033	
72	746 0111	0189	0267	0345	0423	0501	0579	0657	0735	0813	
73	0890	0968	1046	1124	1202	1280	1358	1436	1514	1592	
74	1670	1748	1825	1903	1981	2059	2137	2215	2293	2371	
75	2449	2527	2605	2682	2760	2838	2916	2994	3072	3150	
76	3228	3306	3383	3461	3539	3617	3695	3773	3851	3929	
77	4006	4084	4162	4240	4318	4396	4474	4552	4629	4707	
78	4785	4863	4941	5019	5097	5174	5252	5330	5408	5486	
79	5564	5641	5719	5797	5875	5953	6031	6108	6186	6264	
5580	6342	6420	6498	6575	6653	6731	6809	6887	6965	7042	
81	7120	7198	7276	7354	7431	7509	7587	7665	7743	7821	77
82	7898	7976	8054	8132	8210	8287	8365	8443	8521	8598	1 7.7
83	8676	8754	8832	8910	8987	9065	9143	9221	9299	9376	2 15.4
84	9454	9532	9610	9687	9765	9843	9921	9998	0076	0154	3 23.1 4 30.8
85	747 0232	0310	0387	0465	0543	0621	0698	0776	0854	0932	5 38.5
86	1009	1087	1165	1243	1320	1398	1476	1554	1631	1709	6 46.2
87	1787	1864	1942	2020	2098	2175	2253	2331	2409	2486	7 53.9
88	2564	2642	2719	2797	2875	2953	3030	3108	3186	3263	8 61.6
89	3341	3419	3497	3574	3652	3730	3807	3885	3963	4040	9 69.3
5590	4118	4196	4273	4351	4429	4507	4584	4662	4740	4817	
91	4895	4973	5050	5128	5206	5283	5361	5439	5516	5594	
92	5672	5749	5827	5905	5982	6060	6138	6215	6293	6371	
93	6448	6526	6603	6681	6759	6836	6914	6992	7069	7147	
94	7225	7302	7380	7458	7535	7613	7690	7768	7846	7923	
95	8001	8079	8156	8234	8311	8389	8467	8544	8622	8699	
96	8777	8855	8932	9010	9087	9165	9243	9320	9398	9475	
97	9553	9631	9708	9786	9863	9941	0019	0096	0174	0251	
98	748 0329	0407	0484	0562	0639	0717	0794	0872	0950	1027	
99	1105	1182	1260	1337	1415	1492	1570	1648	1725	1803	
5600	1880	1958	2035	2113	2190	2268	2346	2423	2501	2578	
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5600	748 1880	1958	2035	2113	2190	2268	2346	2423	2501	2578	
01	2656	2733	2811	2888	2966	3043	3121	3198	3276	3354	
02	3431	3509	3586	3664	3741	3819	3896	3974	4051	4129	
03	4206	4284	4361	4439	4516	4594	4671	4749	4826	4904	
04	4981	5059	5136	5214	5291	5369	5446	5524	5601	5679	
05	5756	5834	5911	5989	6066	6144	6221	6299	6376	6453	
06	6531	6608	6686	6763	6841	6918	6996	7073	7151	7228	
07	7306	7383	7460	7538	7615	7693	7770	7848	7925	8003	
08	8080	8157	8235̄	8312	8390	8467	8545̄	8622	8700	8777	
09	8854	8932	9009	9087	9164	9242	9319	9396	9474	9551	
5610	9629	9706	9783	9861	9938	0̄016	0̄093	0̄170	0̄248	0̄325	
11	749 0403	0480	0557	0635̄	0712	0790	0867	0944	1022	1099	78
12	1177	1254	1331	1409	1486	1564	1641	1718	1796	1873	1 7.8
13	1950	2028	2105	2183	2260	2337	2415̄	2492	2569	2647	2 15.6
14	2724	2801	2879	2956	3034	3111	3188	3266	3343	3420	3 23.4
15	3498	3575̄	3652	3730	3807	3884	3962	4039	4116	4194	4 31.2
16	4271	4348	4426	4503	4580	4658	4735̄	4812	4890	4967	5 39.0 6 46.8
17	5044	5122	5199	5276	5353	5431	5508	5585	5663	5740	7 54.6
18	5817	5895̄	5972	6049	6127	6204	6281	6358	6436	6513	8 62.4
19	6590	6668	6745̄	6822	6899	6977	7054	7131	7209	7286	9 70.2
5620	7363	7440	7518	7595̄	7672	7750	7827	7904	7981	8059	
21	8136	8213	8290	8368	8445̄	8522	8599	8677	8754	8831	
22	8908	8986	9063	9140	9217	9295̄	9372	9449	9526	9604	
23	9681	9758	9835	9913	9990	0̄067	0̄144	0̄221	0̄299	0̄376	
24	750 0453	0530	0608	0685̄	0762	0839	0916	0994	1071	1148	
25	1225	1302	1380	1457	1534	1611	1688	1766	1843	1920	
26	1997	2074	2152	2229	2306	2383	2460	2538	2615̄	2692	
27	2769	2846	2924	3001	3078	3155	3232	3309	3387	3464	
28	3541	3618	3695	3772	3850	3927	4004	4081	4158	4235	
29	4312	4390	4467	4544	4621	4698	4775	4853	4930	5007	
5630	5084	5161	5238	5315	5392	5470	5547	5624	5701	5778	
31	5855	5932	6010	6087	6164	6241	6318	6395	6472	6549	77
32	6626	6704	6781	6858	6935̄	7012	7089	7166	7243	7320	1 7.7
33	7398	7475̄	7552	7629	7706	7783	7860	7937	8014	8091	2 15.4 3 23.1
34	8168	8246	8323	8400	8477	8554	8631	8708	8785	8862	4 30.8
35	8939	9016	9093	9170	9247	9325̄	9402	9479	9556	9633	5 38.5
36	9710	9787	9864	9941	0̄018	0̄095	0̄172	0̄249	0̄326	0̄403	6 46.2
37	751 0480	0557	0634	0711	0789	0866	0943	1020	1097	1174	7 53.9
38	1251	1328	1405̄	1482	1559	1636	1713	1790	1867	1944	8 61.6
39	2021	2098	2175̄	2252	2329	2406	2483	2560	2637	2714	9 69.3
5640	2791	2868	2945	3022	3099	3176	3253	3330	3407	3484	
41	3561	3638	3715̄	3792	3869	3946	4023	4100	4177	4254	
42	4331	4408	4485̄	4562	4639	4716	4793	4870	4947	5024	
43	5101	5177	5254	5331	5408	5485	5562	5639	5716	5793	
44	5870	5947	6024	6101	6178	6255̄	6332	6409	6486	6563	
45	6639	6716	6793	6870	6947	7024	7101	7178	7255̄	7332	
46	7409	7486	7563	7639	7716	7793	7870	7947	8024	8101	
47	8178	8255̄	8332	8409	8485	8562	8639	8716	8793	8870	
48	8947	9024	9101	9178	9254	9331	9408	9485	9562	9639	
49	9716	9793	9870	9946	0̄023	0̄100	0̄177	0̄254	0̄331	0̄408	
5650	752 0484	0561	0638	0715	0792	0869	0946	1023	1099	1176	
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5650	752 0484	0561	0638	0715	0792	0869	0946	1023	1099	1176	
51	1253	1330	1407	1484	1560	1637	1714	1791	1868	1945̄	
52	2022	2098	2175	2252	2329	2406	2483	2559	2636	2713	
53	2790	2867	2944	3020	3097	3174	3251	3328	3404	3481	
54	3558	3635̄	3712	3788	3865	3942	4019	4096	4172	4249	
55	4326	4403	4480	4556	4633	4710	4787	4864	4940	5017	
56	5094	5171	5248	5324	5401	5478	5555̄	5631	5708	5785	
57	5862	5939	6015	6092	6169	6246	6322	6399	6476	6553	
58	6629	6706	6783	6860	6936	7013	7090	7167	7243	7320	
59	7397	7474	7550	7627	7704	7781	7857	7934	8011	8088	
5660	8164	8241	8318	8394	8471	8548	8625̄	8701	8778	8855̄	
61	8932	9008	9085̄	9162	9238	9315	9392	9469	9545	9622	77 1 7.7 2 15.4 3 23.1 4 30.8 5 38.5 6 46.2 7 53.9 8 61.6 9 69.3
62	9699	9775	9852	9929	0̄005	0̄082	0̄159	0̄236	0̄312	0̄389	
63	753 0̄466	0542	0619	0696	0772	0849	0926	1002	1079	1156	
64	1232	1309	1386	1462	1539	1616	1692	1769	1846	1922	
65	1999	2076	2152	2229	2306	2382	2459	2536	2612	2689	
66	2766	2842	2919	2996	3072	3149	3226	3302	3379	3455	
67	3532	3609	3685	3762	3839	3915	3992	4069	4145	4222	
68	4298	4375	4452	4528	4605̄	4682	4758	4835̄	4911	4988	
69	5065̄	5141	5218	5294	5371	5448	5524	5601	5677	5754	
5670	5831	5907	5984	6060	6137	6214	6290	6367	6443	6520	
71	6596	6673	6750	6826	6903	6979	7056	7133	7209	7286	
72	7362	7439	7515	7592	7668	7745	7822	7898	7975̄	8051	
73	8128	8204	8281	8357	8434	8511	8587	8664	8740	8817	
74	8893	8970	9046	9123	9199	9276	9353	9429	9506	9582	
75	9659	9735	9812	9888	9965̄	0̄041	0̄118	0̄194	0̄271	0̄347	
76	754 0424	0500	0577	0653	0730	0806	0883	0959	1036	1112	
77	1189	1265	1342	1418	1495̄	1571	1648	1724	1801	1877	
78	1954	2030	2107	2183	2260	2336	2413	2489	2566	2642	
79	2719	2795	2872	2948	3025̄	3101	3178	3254	3330	3407	
5680	3483	3560	3636	3713	3789	3866	3942	4019	4095̄	4171	
81	4248	4324	4401	4477	4554	4630	4707	4783	4859	4936	76 1 7.6 2 15.2 3 22.8 4 30.4 5 38.0 6 45.6 7 53.2 8 60.8 9 68.4
82	5012	5089	5165	5242	5318	5394	5471	5547	5624	5700	
83	5777	5853	5929	6006	6082	6159	6235	6311	6388	6464	
84	6541	6617	6694	6770	6846	6923	6999	7076	7152	7228	
85	7305̄	7381	7457	7534	7610	7687	7763	7839	7916	7992	
86	8069	8145̄	8221	8298	8374	8450	8527	8603	8680	8756	
87	8832	8909	8985	9061	9138	9214	9290	9367	9443	9520	
88	9596	9672	9749	9825̄	9901	9978	0̄054	0̄130	0̄207	0̄283	
89	755 0359	0436	0512	0588	0665̄	0741	0817	0894	0970	1046	
5690	1123	1199	1275	1352	1428	1504	1581	1657	1733	1810	
91	1886	1962	2038	2115̄	2191	2267	2344	2420	2496	2573	
92	2649	2725	2802	2878	2954	3030	3107	3183	3259	3336	
93	3412	3488	3564	3641	3717	3793	3870	3946	4022	4098	
94	4175̄	4251	4327	4403	4480	4556	4632	4709	4785̄	4861	
95	4937	5014	5090	5166	5242	5319	5395̄	5471	5547	5624	
96	5700	5776	5852	5929	6005̄	6081	6157	6233	6310	6386	
97	6462	6538	6615̄	6691	6767	6843	6920	6996	7072	7148	
98	7224	7301	7377	7453	7529	7606	7682	7758	7834	7910	
99	7987	8063	8139	8215	8291	8368	8444	8520	8596	8672	
5700	8749	8825̄	8901	8977	9053	9130	9206	9282	9358	9434	
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5700	755 8749	8825̄	8901	8977	9053	9130	9206	9282	9358	9434
01	9510	9587	9663	9739	9815	9891	9967	0̄044	0̄120	0̄196
02	756 0272	0348	0424	0501	0577	0653	0729	0805	0881	0958
03	1034	1110	1186	1262	1338	1414	1491	1567	1643	1719
04	1795	1871	1947	2024	2100	2176	2252	2328	2404	2480
05	2556	2633	2709	2785̄	2861	2937	3013	3089	3165	3242
06	3318	3394	3470	3546	3622	3698	3774	3850	3927	4003
07	4079	4155̄	4231	4307	4383	4459	4535	4611	4687	4764
08	4840	4916	4992	5068	5144	5220	5296	5372	5448	5524
09	5600	5677	5753	5829	5905̄	5981	6057	6133	6209	6285
5710	6361	6437	6513	6589	6665	6741	6817	6893	6970	7046
11	7122	7198	7274	7350	7426	7502	7578	7654	7730	7806
12	7882	7958	8034	8110	8186	8262	8338	8414	8490	8566
13	8642	8718	8794	8870	8946	9022	9098	9174	9250	9326
14	9402	9478	9554	9630	9706	9782	9858	9934	0̄010	0̄086
15	757 0162	0238	0314	0390	0466	0542	0618	0694	0770	0846
16	0922	0998	1074	1150	1226	1302	1378	1454	1530	1606
17	1682	1758	1834	1910	1986	2062	2138	2214	2290	2366
18	2442	2517	2593	2669	2745	2821	2897	2973	3049	3125
19	3201	3277	3353	3429	3505̄	3581	3657	3733	3808	3884
5720	3960	4036	4112	4188	4264	4340	4416	4492	4568	4644
21	4719	4795	4871	4947	5023	5099	5175̄	5251	5327	5403
22	5479	5554	5630	5706	5782	5858	5934	6010	6086	6162
23	6237	6313	6389	6465	6541	6617	6693	6769	6845̄	6920
24	6996	7072	7148	7224	7300	7376	7451	7527	7603	7679
25	7755̄	7831	7907	7982	8058	8134	8210	8286	8362	8438
26	8513	8589	8665	8741	8817	8893	8968	9044	9120	9196
27	9272	9348	9423	9499	9575	9651	9727	9803	9878	9954
28	758 0030	0106	0182	0258	0333	0409	0485̄	0561	0637	0712
29	0788	0864	0940	1016	1091	1167	1243	1319	1395̄	1470
5730	1546	1622	1698	1774	1849	1925	2001	2077	2153	2228
31	2304	2380	2456	2531	2607	2683	2759	2835̄	2910	2986
32	3062	3138	3213	3289	3365̄	3441	3516	3592	3668	3744
33	3819	3895	3971	4047	4122	4198	4274	4350	4425	4501
34	4577	4653	4728	4804	4880	4956	5031	5107	5183	5258
35	5334	5410	5486	5561	5637	5713	5789	5864	5940	6016
36	6091	6167	6243	6319	6394	6470	6546	6621	6697	6773
37	6848	6924	7000	7076	7151	7227	7303	7378	7454	7530
38	7605	7681	7757	7832	7908	7984	8060	8135	8211	8287
39	8362	8438	8514	8589	8665̄	8741	8816	8892	8968	9043
5740	9119	9195̄	9270	9346	9422	9497	9573	9649	9724	9800
41	9875	9951	0̄027	0̄102	0̄178	0̄254	0̄329	0̄405̄	0̄481	0̄556
42	759 0632	0708	0783	0859	0934	1010	1086	1161	1237	1313
43	1388	1464	1539	1615	1691	1766	1842	1917	1993	2069
44	2144	2220	2296	2371	2447	2522	2598	2674	2749	2825̄
45	2900	2976	3052	3127	3203	3278	3354	3429	3505	3581
46	3656	3732	3807	3883	3959	4034	4110	4185	4261	4336
47	4412	4488	4563	4639	4714	4790	4865	4941	5016	5092
48	5168	5243	5319	5394	5470	5545	5621	5696	5772	5848
49	5923	5999	6074	6150	6225	6301	6376	6452	6527	6603
5750	6678	6754	6830	6905	6981	7056	7132	7207	7283	7358
N.	0	1	2	3	4	5	6	7	8	9

P. P.

	77
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3	23.1
4	30.8
5	38.5
6	46.2
7	53.9
8	61.6
9	69.3

	76
1	7.6
2	15.2
3	22.8
4	30.4
5	38.0
6	45.6
7	53.2
8	60.8
9	68.4

	75
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2	15.0
3	22.5
4	30.0
5	37.5
6	45.0
7	52.5
8	60.0
9	67.5

P. P.

N.	0	1	2	3	4	5	6	7	8	9	P. P.
5750	759 6678	6754	6830	6905	6981	7056	7132	7207	7283	7358	
51	7434	7509	7585̄	7660	7736	7811	7887	7962	8038	8113	
52	8189	8264	8340	8415	8491	8566	8642	8717	8793	8868	
53	8944	9019	9095̄	9170	9246	9321	9397	9472	9548	9623	
54	9699	9774	9850	9925	0̄000	0̄076	0̄151	0̄227	0̄302	0̄378	
55	760 0453	0529	0604	0680	0755	0831	0906	0981	1057	1132	
56	1208	1283	1359	1434	1510	1585	1661	1736	1811	1887	
57	1962	2038	2113	2189	2264	2339	2415̄	2490	2566	2641	76 1 7.6 2 15.2 3 22.8 4 30.4 5 38.0 6 45.6 7 53.2 8 60.8 9 68.4
58	2717	2792	2867	2943	3018	3094	3169	3245̄	3320	3395	
59	3471	3546	3622	3697	3772	3848	3923	3999	4074	4149	
5760	4225̄	4300	4376	4451	4526	4602	4677	4753	4828	4903	
61	4979	5054	5130	5205̄	5280	5356	5431	5506	5582	5657	
62	5733	5808	5883	5959	6034	6109	6185̄	6260	6335	6411	
63	6486	6562	6637	6712	6788	6863	6938	7014	7089	7164	
64	7240	7315	7390	7466	7541	7616	7692	7767	7842	7918	
65	7993	8068	8144	8219	8294	8370	8445	8520	8596	8671	
66	8746	8822	8897	8972	9048	9123	9198	9274	9349	9424	
67	9500	9575̄	9650	9725	9801	9876	9951	0̄027	0̄102	0̄177	
68	761 0253	0328	0403	0478	0554	0629	0704	0780	0855̄	0930	
69	1005	1081	1156	1231	1307	1382	1457	1532	1608	1683	
5770	1758	1833	1909	1984	2059	2134	2210	2285̄	2360	2435	
71	2511	2586	2661	2737	2812	2887	2962	3037	3113	3188	75 1 7.5 2 15.0 3 22.5 4 30.0 5 37.5 6 45.0 7 52.5 8 60.0 9 67.5
72	3263	3338	3414	3489	3564	3639	3715̄	3790	3865	3940	
73	4016	4091	4166	4241	4316	4392	4467	4542	4617	4693	
74	4768	4843	4918	4993	5069	5144	5219	5294	5369	5445̄	
75	5520	5595	5670	5745	5821	5896	5971	6046	6121	6197	
76	6272	6347	6422	6497	6573	6648	6723	6798	6873	6948	
77	7024	7099	7174	7249	7324	7400	7475̄	7550	7625	7700	
78	7775	7851	7926	8001	8076	8151	8226	8301	8377	8452	
79	8527	8602	8677	8752	8828	8903	8978	9053	9128	9203	
5780	9278	9354	9429	9504	9579	9654	9729	9804	9879	9955̄	
81	762 0030	0105̄	0180	0255	0330	0405	0480	0556	0631	0706	
82	0781	0856	0931	1006	1081	1156	1232	1307	1382	1457	
83	1532	1607	1682	1757	1832	1907	1982	2058	2133	2208	
84	2283	2358	2433	2508	2583	2658	2733	2808	2883	2959	
85	3034	3109	3184	3259	3334	3409	3484	3559	3634	3709	
86	3784	3859	3934	4009	4085̄	4160	4235̄	4310	4385̄	4460	74 1 7.4 2 14.8 3 22.2 4 29.6 5 37.0 6 44.4 7 51.8 8 59.2 9 66.6
87	4535̄	4610	4685̄	4760	4835̄	4910	4985	5060	5135	5210	
88	5285	5360	5435	5510	5585	5660	5735	5810	5885	5960	
89	6035	6111	6186	6261	6336	6411	6486	6561	6636	6711	
5790	6786	6861	6936	7011	7086	7161	7236	7311	7386	7461	
91	7536	7611	7686	7761	7836	7911	7986	8061	8136	8211	
92	8286	8361	8435	8510	8585	8660	8735	8810	8885	8960	
93	9035	9110	9185	9260	9335	9410	9485	9560	9635̄	9710	
94	9785̄	9860	9935̄	0̄010	0̄085̄	0̄160	0̄235̄	0̄310	0̄385̄	0̄459	
95	763 0534	0609	0684	0759	0834	0909	0984	1059	1134	1209	
96	1284	1359	1434	1509	1583	1658	1733	1808	1883	1958	
97	2033	2108	2183	2258	2333	2408	2482	2557	2632	2707	
98	2782	2857	2932	3007	3082	3157	3232	3306	3381	3456	
99	3531	3606	3681	3756	3831	3906	3980	4055	4130	4205	
5800	4280	4355̄	4430	4505̄	4579	4654	4729	4804	4879	4954	
N.	0	1	2	3	4	5	6	7	8	9	P. P.

N.	0	1	2	3	4	5	6	7	8	9	P. P.
5800	763 4280	435̄5̄	4430	4505̄	4579	4654	4729	4804	4879	4954	
01	5029	5104	5178	5253	5328	5403	5478	5553	5628	5702	
02	5777	5852	5927	6002	6077	6151	6226	6301	6376	6451	
03	6526	6601	6675	6750	6825	6900	6975̄	7050	7124	7199	
04	7274	7349	7424	7499	7573	7648	7723	7798	7873	7947	
05	8022	8097	8172	8247	8321	8396	8471	8546	8621	8696	
06	8770	8845	8920	8995̄	9070	9144	9219	9294	9369	9443	
07	9518	9593	9668	9743	9817	9892	9967	0̄042	0̄117	0̄191	
08	764 0266	0341	0416	0490	0565	0640	0715̄	0789	0864	0939	
09	1014	1089	1163	1238	1313	1388	1462	1537	1612	1687	
5810	1761	1836	1911	1986	2060	2135	2210	2285̄	2359	2434	
11	2509	2583	2658	2733	2808	2882	2957	3032	3107	3181	75 1 7.5 2 15.0 3 22.5 4 30.0 5 37.5 6 45.0 7 52.5 8 60.0 9 67.5
12	3256	3331	3406	3480	3555̄	3630	3704	3779	3854	3929	
13	4003	4078	4153	4227	4302	4377	4451	4526	4601	4676	
14	4750	4825̄	4900	4974	5049	5124	5198	5273	5348	5423	
15	5497	5572	5647	5721	5796	5871	5945	6020	6095̄	6169	
16	6244	6319	6393	6468	6543	6617	6692	6767	6841	6916	
17	6991	7065	7140	7215̄	7289	7364	7439	7513	7588	7663	
18	7737	7812	7886	7961	8036	8110	8185	8260	8334	8409	
19	8484	8558	8633	8707	8782	8857	8931	9006	9081	9155	
5820	9230	9304	9379	9454	9528	9603	9678	9752	9827	9901	
21	9976	0̄051	0̄125	0̄200	0̄274	0̄349	0̄424	0̄498	0̄573	0̄647	
22	765 0722	0797	0871	0946	1020	1095̄	1170	1244	1319	1393	
23	1468	1542	1617	1692	1766	1841	1915	1990	2065̄	2139	
24	2214	2288	2363	2437	2512	2586	2661	2736	2810	2885̄	
25	2959	3034	3108	3183	3258	3332	3407	3481	3556	3630	
26	3705̄	3779	3854	3928	4003	4078	4152	4227	4301	4376	
27	4450	4525̄	4599	4674	4748	4823	4897	4972	5046	5121	
28	5195	5270	5344	5419	5493	5568	5643	5717	5792	5866	
29	5941	6015	6090	6164	6239	6313	6388	6462	6537	6611	
5830	6686	6760	6835̄	6909	6984	7058	7132	7207	7281	7356	
31	7430	7505̄	7579	7654	7728	7803	7877	7952	8026	8101	74 1 7.4 2 14.8 3 22.2 4 29.6 5 37.0 6 44.4 7 51.8 8 59.2 9 66.6
32	8175	8250	8324	8399	8473	8547	8622	8696	8771	8845	
33	8920	8994	9069	9143	9218	9292	9366	9441	9515	9590	
34	9664	9739	9813	9888	9962	0̄036	0̄111	0̄185	0̄260	0̄334	
35	766 0409	0483	0557	0632	0706	0781	0855	0930	1004	1078	
36	1153	1227	1302	1376	1450	1525̄	1599	1674	1748	1823	
37	1897	1971	2046	2120	2195̄	2269	2343	2418	2492	2567	
38	2641	2715	2790	2864	2938	3013	3087	3162	3236	3310	
39	3385̄	3459	3534	3608	3682	3757	3831	3905	3980	4054	
5840	4128	4203	4277	4352	4426	4500	4575̄	4649	4723	4798	
41	4872	4946	5021	5095	5169	5244	5318	5393	5467	5541	
42	5616	5690	5764	5839	5913	5987	6062	6136	6210	6285̄	
43	6359	6433	6508	6582	6656	6730	6805̄	6879	6953	7028	
44	7102	7176	7251	7325	7399	7474	7548	7622	7697	7771	
45	7845	7919	7994	8068	8142	8217	8291	8365	8440	8514	
46	8588	8662	8737	8811	8885	8960	9034	9108	9182	9257	
47	9331	9405	9479	9554	9628	9702	9777	9851	9925	9999	
48	767 0074	0148	0222	0296	0371	0445̄	0519	0593	0668	0742	
49	0816	0890	0965̄	1039	1113	1187	1262	1336	1410	1484	
5850	1559	1633	1707	1781	1856	1930	2004	2078	2153	2227	
N.	0	1	2	3	4	5	6	7	8	9	P. P.

5850 — 5900

N.	0	1	2	3	4	5	6	7	8	9
5850	767 1559	1633	1707	1781	1856	1930	2004	2078	2153	2227
51	2301	2375	2449	2524	2598	2672	2746	2821	2895̄	2969
52	3043	3117	3192	3266	3340	3414	3488	3563	3637	3711
53	3785	3859	3934	4008	4082	4156	4230	4305̄	4379	4453
54	4527	4601	4676	4750	4824	4898	4972	5046	5121	5195̄
55	5269	5343	5417	5492	5566	5640	5714	5788	5862	5937
56	6011	6085̄	6159	6233	6307	6381	6456	6530	6604	6678
57	6752	6826	6901	6975̄	7049	7123	7197	7271	7345	7420
58	7494	7568	7642	7716	7790	7864	7938	8013	8087	8161
59	8235̄	8309	8383	8457	8531	8606	8680	8754	8828	8902
5860	8976	9050	9124	9198	9273	9347	9421	9495̄	9569	9643
61	9717	9791	9865	9940	0̄014	0̄088	0̄162	0̄236	0̄310	0̄384
62	768 0458	0532	0606	0680	0754	0829	0903	0977	1051	1125̄
63	1199	1273	1347	1421	1495	1569	1643	1717	1791	1866
64	1940	2014	2088	2162	2236	2310	2384	2458	2532	2606
65	2680	2754	2828	2902	2976	3050	3124	3198	3273	3347
66	3421	3495̄	3569	3643	3717	3791	3865̄	3939	4013	4087
67	4161	4235̄	4309	4383	4457	4531	4605̄	4679	4753	4827
68	4901	4975	5049	5123	5197	5271	5345	5419	5493	5567
69	5641	5715	5789	5863	5937	6011	6085	6159	6233	6307
5870	6381	6455̄	6529	6603	6677	6751	6825̄	6899	6973	7047
71	7121	7195̄	7269	7343	7417	7491	7565̄	7639	7713	7787
72	7860	7934	8008	8082	8156	8230	8304	8378	8452	8526
73	8600	8674	8748	8822	8896	8970	9044	9118	9192	9265
74	9339	9413	9487	9561	9635	9709	9783	9857	9931	0̄005̄
75	769 0079	0153	0227	0300	0374	0448	0522	0596	0670	0744
76	0818	0892	0966	1040	1114	1187	1261	1335	1409	1483
77	1557	1631	1705̄	1779	1852	1926	2000	2074	2148	2222
78	2296	2370	2444	2517	2591	2665	2739	2813	2887	2961
79	3035̄	3108	3182	3256	3330	3404	3478	3552	3626	3699
5880	3773	3847	3921	3995̄	4069	4143	4216	4290	4364	4438
81	4512	4586	4659	4733	4807	4881	4955̄	5029	5103	5176
82	5250	5324	5398	5472	5546	5619	5693	5767	5841	5915̄
83	5988	6062	6136	6210	6284	6358	6431	6505	6579	6653
84	6727	6800	6874	6948	7022	7096	7169	7243	7317	7391
85	7465̄	7538	7612	7686	7760	7834	7907	7981	8055	8129
86	8203	8276	8350	8424	8498	8571	8645	8719	8793	8867
87	8940	9014	9088	9162	9235	9309	9383	9457	9530	9604
88	9678	9752	9826	9899	9973	0̄047	0̄121	0̄194	0̄268	0̄342
89	770 0416	0489	0563	0637	0711	0784	0858	0932	1005	1079
5890	1153	1227	1300	1374	1448	1522	1595	1669	1743	1817
91	1890	1964	2038	2111	2185	2259	2333	2406	2480	2554
92	2627	2701	2775̄	2849	2922	2996	3070	3143	3217	3291
93	3364	3438	3512	3585	3659	3733	3807	3880	3954	4028
94	4101	4175̄	4249	4322	4396	4470	4543	4617	4691	4764
95	4838	4912	4985	5059	5133	5206	5280	5354	5427	5501
96	5575̄	5648	5722	5796	5869	5943	6017	6090	6164	6238
97	6311	6385̄	6459	6532	6606	6679	6753	6827	6900	6974
98	7048	7121	7195̄	7269	7342	7416	7489	7563	7637	7710
99	7784	7858	7931	8005̄	8078	8152	8226	8299	8373	8447
5900	8520	8594	8667	8741	8815̄	8888	8962	9035	9109	9183
N.	0	1	2	3	4	5	6	7	8	9

P. P.

	74
1	7.4
2	14.8
3	22.2
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5	37.0
6	44.4
7	51.8
8	59.2
9	66.6

	73
1	7.3
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3	21.9
4	29.2
5	36.5
6	43.8
7	51.1
8	58.4
9	65.7

5900 — 5950

N.	0	1	2	3	4	5	6	7	8	9
5900	770 8520	8594	8667	8741	8815̄	8888	8962	9035	9109	9183
01	9256	9330	9403	9477	9551	9624	9698	9771	9845̄	9918
02	9992	0̄066	0̄139	0̄213	0̄286	0̄360	0̄434	0̄507	0̄581	0̄654
03	771 0728	0801	0875̄	0949	1022	1096	1169	1243	1316	1390
04	1463	1537	1611	1684	1758	1831	1905̄	1978	2052	2125
05	2199	2273	2346	2420	2493	2567	2640	2714	2787	2861
06	2934	3008	3081	3155	3229	3302	3376	3449	3523	3596
07	3670	3743	3817	3890	3964	4037	4111	4184	4258	4331
08	4405̄	4478	4552	4625	4699	4772	4846	4919	4993	5066
09	5140	5213	5287	5360	5434	5507	5581	5654	5728	5801
5910	5875̄	5948	6022	6095	6169	6242	6316	6389	6463	6536
11	6610	6683	6757	6830	6903	6977	7050	7124	7197	7271
12	7344	7418	7491	7565̄	7638	7712	7785̄	7858	7932	8005
13	8079	8152	8226	8299	8373	8446	8519	8593	8666	8740
14	8813	8887	8960	9034	9107	9180	9254	9327	9401	9474
15	9547	9621	9694	9768	9841	9915̄	9988	0̄061	0̄135̄	0̄208
16	772 0282	0355	0428	0502	0575	0649	0722	0795	0869	0942
17	1016	1089	1162	1236	1309	1383	1456	1529	1603	1676
18	1750	1823	1896	1970	2043	2117	2190	2263	2337	2410
19	2483	2557	2630	2704	2777	2850	2924	2997	3070	3144
5920	3217	3290	3364	3437	3510	3584	3657	3731	3804	3877
21	3951	4024	4097	4171	4244	4317	4391	4464	4537	4611
22	4684	4757	4831	4904	4977	5051	5124	5197	5271	5344
23	5417	5491	5564	5637	5711	5784	5857	5931	6004	6077
24	6150	6224	6297	6370	6444	6517	6590	6664	6737	6810
25	6884	6957	7030	7103	7177	7250	7323	7397	7470	7543
26	7616	7690	7763	7836	7910	7983	8056	8129	8203	8276
27	8349	8423	8496	8569	8642	8716	8789	8862	8935	9009
28	9082	9155	9228	9302	9375̄	9448	9521	9595̄	9668	9741
29	9815̄	9888	9961	0̄034	0̄107	0̄181	0̄254	0̄327	0̄400	0̄474
5930	773 0547	0620	0693	0767	0840	0913	0986	1060	1133	1206
31	1279	1352	1426	1499	1572	1645	1719	1792	1865̄	1938
32	2011	2085̄	2158	2231	2304	2377	2451	2524	2597	2670
33	2743	2817	2890	2963	3036	3109	3183	3256	3329	3402
34	3475	3549	3622	3695̄	3768	3841	3915̄	3988	4061	4134
35	4207	4280	4354	4427	4500	4573	4646	4719	4793	4866
36	4939	5012	5085	5158	5232	5305̄	5378	5451	5524	5597
37	5670	5744	5817	5890	5963	6036	6109	6183	6256	6329
38	6402	6475	6548	6621	6694	6768	6841	6914	6987	7060
39	7133	7206	7280	7353	7426	7499	7572	7645	7718	7791
5940	7864	7938	8011	8084	8157	8230	8303	8376	8449	8522
41	8596	8669	8742	8815̄	8888	8961	9034	9107	9180	9253
42	9326	9400	9473	9546	9619	9692	9765̄	9838	9911	9984
43	774 0057	0130	0203	0277	0350	0423	0496	0569	0642	0715̄
44	0788	0861	0934	1007	1080	1153	1226	1299	1372	1446
45	1519	1592	1665̄	1738	1811	1884	1957	2030	2103	2176
46	2249	2322	2395	2468	2541	2614	2687	2760	2833	2906
47	2979	3052	3125	3198	3271	3345̄	3418	3491	3564	3637
48	3710	3783	3856	3929	4002	4075̄	4148	4221	4294	4367
49	4440	4513	4586	4659	4732	4805̄	4878	4951	5024	5097
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P. P.

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8	58.4
9	65.7

P. P.

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5950	774 5170	5243	5316	5389	5462	5535̄	5608	5681	5754	5827	
51	5900	5972	6045	6118	6191	6264	6337	6410	6483	6556	
52	6629	6702	6775	6848	6921	6994	7067	7140	7213	7286	
53	7359	7432	7505̄	7578	7651	7724	7797	7869	7942	8015	
54	8088	8161	8234	8307	8380	8453	8526	8599	8672	8745̄	
55	8818	8891	8964	9036	9109	9182	9255	9328	9401	9474	
56	9547	9620	9693	9766	9839	9911	9984	0̄057	0̄130	0̄203	
57	775 0276	0349	0422	0495̄	0568	0641	0713	0786	0859	0932	
58	1005̄	1078	1151	1224	1297	1369	1442	1515	1588	1661	
59	1734	1807	1880	1952	2025	2098	2171	2244	2317	2390	
5960	2463	2535	2608	2681	2754	2827	2900	2973	3046	3118	
61	3191	3264	3337	3410	3483	3555	3628	3701	3774	3847	73 1 7.3 2 14.6 3 21.9 4 29.2 5 36.5 6 43.8 7 51.1 8 58.4 9 65.7
62	3920	3993	4065	4138	4211	4284	4357	4430	4502	4575	
63	4648	4721	4794	4867	4939	5012	5085	5158	5231	5304	
64	5376	5449	5522	5595̄	5668	5740	5813	5886	5959	6032	
65	6104	6177	6250	6323	6396	6469	6541	6614	6687	6760	
66	6832	6905	6978	7051	7124	7196	7269	7342	7415̄	7488	
67	7560	7633	7706	7779	7851	7924	7997	8070	8143	8215	
68	8288	8361	8434	8506	8579	8652	8725̄	8798	8870	8943	
69	9016	9089	9161	9234	9307	9380	9452	9525	9598	9671	
5970	9743	9816	9889	9962	0̄034	0̄107	0̄180	0̄253	0̄325	0̄398	
71	776 0471	0543	0616	0689	0762	0834	0907	0980	1053	1125	
72	1198	1271	1343	1416	1489	1562	1634	1707	1780	1852	
73	1925	1998	2071	2143	2216	2289	2361	2434	2507	2579	
74	2652	2725̄	2798	2870	2943	3016	3088	3161	3234	3306	
75	3379	3452	3524	3597	3670	3743	3815	3888	3961	4033	
76	4106	4179	4251	4324	4397	4469	4542	4615̄	4687	4760	
77	4833	4905	4978	5051	5123	5196	5269	5341	5414	5486	
78	5559	5632	5704	5777	5850	5922	5995̄	6068	6140	6213	
79	6286	6358	6431	6503	6576	6649	6721	6794	6867	6939	
5980	7012	7084	7157	7230	7302	7375̄	7448	7520	7593	7665	
81	7738	7811	7883	7956	8028	8101	8174	8246	8319	8391	72 1 7.2 2 14.4 3 21.6 4 28.8 5 36.0 6 43.2 7 50.4 8 57.6 9 64.8
82	8464	8537	8609	8682	8754	8827	8900	8972	9045̄	9117	
83	9190	9263	9335	9408	9480	9553	9626	9698	9771	9843	
84	9916	9988	0̄061	0̄134	0̄206	0̄279	0̄351	0̄424	0̄496	0̄569	
85	777 0642	0714	0787	0859	0932	1004	1077	1149	1222	1295̄	
86	1367	1440	1512	1585̄	1657	1730	1802	1875̄	1947	2020	
87	2093	2165	2238	2310	2383	2455	2528	2600	2673	2745	
88	2818	2890	2963	3035	3108	3181	3253	3326	3398	3471	
89	3543	3616	3688	3761	3833	3906	3978	4051	4123	4196	
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91	4993	5066	5138	5211	5283	5356	5428	5501	5573	5646	
92	5718	5791	5863	5935	6008	6080	6153	6225	6298	6370	
93	6443	6515	6588	6660	6733	6805	6878	6950	7022	7095̄	
94	7167	7240	7312	7385̄	7457	7530	7602	7675̄	7747	7819	
95	7892	7964	8037	8109	8182	8254	8327	8399	8471	8544	
96	8616	8689	8761	8834	8906	8978	9051	9123	9196	9268	
97	9340	9413	9485	9558	9630	9703	9775̄	9847	9920	9992	
98	778 0065̄	0137	0209	0282	0354	0427	0499	0571	0644	0716	
99	0789	0861	0933	1006	1078	1151	1223	1295	1368	1440	
6000	1513	1585̄	1657	1730	1802	1874	1947	2019	2092	2164	
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6000	778 1513	1585̄	1657	1730	1802	1874	1947	2019	2092	2164	
01	2236	2309	2381	2453	2526	2598	2670	2743	2815	2888	
02	2960	3032	3105̄	3177	3249	3322	3394	3466	3539	3611	
03	3683	3756	3828	3900	3973	4045	4117	4190	4262	4335̄	
04	4407	4479	4552	4624	4696	4768	4841	4913	4985	5058	
05	5130	5202	5275̄	5347	5419	5492	5564	5636	5709	5781	
06	5853	5926	5998	6070	6143	6215̄	6287	6359	6432	6504	
07	6576	6649	6721	6793	6866	6938	7010	7082	7155̄	7227	
08	7299	7372	7444	7516	7588	7661	7733	7805	7877	7950	
09	8022	8094	8167	8239	8311	8383	8456	8528	8600	8672	
6010	8745̄	8817	8889	8962	9034	9106	9178	9251	9323	9395	
11	9467	9540	9612	9684	9756	9829	9901	9973	0̄045	0̄117	73 1 7.3 2 14.6 3 21.9 4 29.2 5 36.5 6 43.8 7 51.1 8 58.4 9 65.7
12	779 0190	0262	0334	0406	0479	0551	0623	0695	0768	0840	
13	0912	0984	1056	1129	1201	1273	1345	1418	1490	1562	
14	1634	1706	1779	1851	1923	1995	2067	2140	2212	2284	
15	2356	2429	2501	2573	2645	2717	2790	2862	2934	3006	
16	3078	3150	3223	3295̄	3367	3439	3511	3584	3656	3728	
17	3800	3872	3944	4017	4089	4161	4233	4305	4377	4450	
18	4522	4594	4666	4738	4810	4883	4955̄	5027	5099	5171	
19	5243	5316	5388	5460	5532	5604	5676	5748	5821	5893	
6020	5965̄	6037	6109	6181	6253	6326	6398	6470	6542	6614	
21	6686	6758	6831	6903	6975̄	7047	7119	7191	7263	7335	
22	7408	7480	7552	7624	7696	7768	7840	7912	7984	8057	
23	8129	8201	8273	8345̄	8417	8489	8561	8633	8705	8778	
24	8850	8922	8994	9066	9138	9210	9282	9354	9426	9498	
25	9571	9643	9715̄	9787	9859	9931	0̄003	0̄075	0̄147	0̄219	
26	780 0291	0363	0435	0507	0580	0652	0724	0796	0868	0940	
27	1012	1084	1156	1228	1300	1372	1444	1516	1588	1660	
28	1732	1804	1877	1949	2021	2093	2165̄	2237	2309	2381	
29	2453	2525̄	2597	2669	2741	2813	2885	2957	3029	3101	
6030	3173	3245	3317	3389	3461	3533	3605	3677	3749	3821	
31	3893	3965	4037	4109	4181	4253	4325	4397	4469	4541	72 1 7.2 2 14.4 3 21.6 4 28.8 5 36.0 6 43.2 7 50.4 8 57.6 9 64.8
32	4613	4685	4757	4829	4901	4973	5045	5117	5189	5261	
33	5333	5405	5477	5549	5621	5693	5765	5837	5909	5981	
34	6053	6125	6197	6269	6341	6413	6485̄	6557	6629	6701	
35	6773	6845̄	6917	6989	7061	7133	7204	7276	7348	7420	
36	7492	7564	7636	7708	7780	7852	7924	7996	8068	8140	
37	8212	8284	8356	8428	8500	8571	8643	8715	8787	8859	
38	8931	9003	9075̄	9147	9219	9291	9363	9435̄	9506	9578	
39	9650	9722	9794	9866	9938	0̄010	0̄082	0̄154	0̄226	0̄297	
6040	781 0369	0441	0513	0585	0657	0729	0801	0873	0945̄	1016	
41	1088	1160	1232	1304	1376	1448	1520	1592	1663	1735	
42	1807	1879	1951	2023	2095̄	2167	2238	2310	2382	2454	
43	2526	2598	2670	2742	2813	2885	2957	3029	3101	3173	
44	3245̄	3316	3388	3460	3532	3604	3676	3748	3819	3891	
45	3963	4035̄	4107	4179	4250	4322	4394	4466	4538	4610	
46	4681	4753	4825	4897	4969	5041	5112	5184	5256	5328	
47	5400	5472	5543	5615	5687	5759	5831	5902	5974	6046	
48	6118	6190	6261	6333	6405	6477	6549	6620	6692	6764	
49	6836	6908	6979	7051	7123	7195̄	7267	7338	7410	7482	
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N.	0	1	2	3	4	5	6	7	8	9	P. P.

N.	0	1	2	3	4	5	6	7	8	9
6050	781 7554	7626	7697	7769	7841	7913	7984	8056	8128	8200
51	8272	8343	8415	8487	8559	8630	8702	8774	8846	8917
52	8989	9061	9133	9204	9276	9348	9420	9491	9563	9635
53	9707	9778	9850	9922	9994	0̄065	0̄137	0̄209	0̄281	0̄352
54	782 0424	0496	0568	0639	0711	0783	0855	0926	0998	1070
55	1141	1213	1285	1357	1428	1500	1572	1644	1715	1787
56	1859	1930	2002	2074	2146	2217	2289	2361	2432	2504
57	2576	2647	2719	2791	2863	2934	3006	3078	3149	3221
58	3293	3364	3436	3508	3579	3651	3723	3794	3866	3938
59	4010	4081	4153	4225	4296	4368	4440	4511	4583	4655
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61	5443	5514	5586	5658	5729	5801	5873	5944	6016	6088
62	6159	6231	6303	6374	6446	6518	6589	6661	6732	6804
63	6876	6947	7019	7091	7162	7234	7305	7377	7449	7520
64	7592	7664	7735	7807	7878	7950	8022	8093	8165	8236
65	8308	8380	8451	8523	8594	8666	8738	8809	8881	8952
66	9024	9096	9167	9239	9310	9382	9454	9525	9597	9668
67	9740	9812	9883	9955	0̄026	0̄098	0̄169	0̄241	0̄313	0̄384
68	783 0456	0527	0599	0670	0742	0814	0885	0957	1028	1100
69	1171	1243	1314	1386	1458	1529	1601	1672	1744	1815
6070	1887	1958	2030	2102	2173	2245	2316	2388	2459	2531
71	2602	2674	2745	2817	2888	2960	3032	3103	3175	3246
72	3318	3389	3461	3532	3604	3675	3747	3818	3890	3961
73	4033	4104	4176	4247	4319	4390	4462	4533	4605	4676
74	4748	4819	4891	4962	5034	5105	5177	5248	5320	5391
75	5463	5534	5606	5677	5749	5820	5892	5963	6035	6106
76	6178	6249	6321	6392	6464	6535	6606	6678	6749	6821
77	6892	6964	7035	7107	7178	7250	7321	7393	7464	7536
78	7607	7678	7750	7821	7893	7964	8036	8107	8179	8250
79	8321	8393	8464	8536	8607	8679	8750	8821	8893	8964
6080	9036	9107	9179	9250	9322	9393	9464	9536	9607	9679
81	9750	9821	9893	9964	0̄036	0̄107	0̄179	0̄250	0̄321	0̄393
82	784 0464	0536	0607	0678	0750	0821	0893	0964	1035	1107
83	1178	1250	1321	1392	1464	1535	1607	1678	1749	1821
84	1892	1963	2035	2106	2178	2249	2320	2392	2463	2534
85	2606	2677	2749	2820	2891	2963	3034	3105	3177	3248
86	3319	3391	3462	3534	3605	3676	3748	3819	3890	3962
87	4033	4104	4176	4247	4318	4390	4461	4532	4604	4675
88	4746	4818	4889	4960	5032	5103	5174	5246	5317	5388
89	5460	5531	5602	5674	5745	5816	5888	5959	6030	6102
6090	6173	6244	6316	6387	6458	6529	6601	6672	6743	6815
91	6886	6957	7029	7100	7171	7242	7314	7385	7456	7528
92	7599	7670	7742	7813	7884	7955	8027	8098	8169	8241
93	8312	8383	8454	8526	8597	8668	8739	8811	8882	8953
94	9024	9096	9167	9238	9310	9381	9452	9523	9595	9666
95	9737	9808	9880	9951	0̄022	0̄093	0̄165	0̄236	0̄307	0̄378
96	785 0450	0521	0592	0663	0735	0806	0877	0948	1019	1091
97	1162	1233	1304	1376	1447	1518	1589	1661	1732	1803
98	1874	1945	2017	2088	2159	2230	2301	2373	2444	2515
99	2586	2658	2729	2800	2871	2942	3014	3085	3156	3227
6100	3298	3370	3441	3512	3583	3654	3726	3797	3868	3939
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P. P.

	72
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2	14.4
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4	28.8
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7	50.4
8	57.6
9	64.8

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2	14.2
3	21.3
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8	56.8
9	63.9

P. P.

6100 — 6150

N.	0	1	2	3	4	5	6	7	8	9	P. P.
6100	785 3298	3370	3441	3512	3583	3654	3726	3797	3868	3939	
01	4010	4081	4153	4224	4295	4366	4437	4509	4580	4651	
02	4722	4793	4864	4936	5007	5078	5149	5220	5291	5363	
03	5434	5505	5576	5647	5718	5789	5861	5932	6003	6074	
04	6145	6216	6288	6359	6430	6501	6572	6643	6714	6786	
05	6857	6928	6999	7070	7141	7212	7283	7355	7426	7497	
06	7568	7639	7710	7781	7852	7924	7995	8066	8137	8208	
07	8279	8350	8421	8493	8564	8635	8706	8777	8848	8919	
08	8990	9061	9132	9204	9275	9346	9417	9488	9559	9630	
09	9701	9772	9843	9915	9986	0057	0128	0199	0270	0341	
6110	786 0412	0483	0554	0625	0696	0767	0839	0910	0981	1052	
11	1123	1194	1265	1336	1407	1478	1549	1620	1691	1762	72 1 7.2 2 14.4 3 21.6 4 28.8 5 36.0 6 43.2 7 50.4 8 57.6 9 64.8
12	1833	1905	1976	2047	2118	2189	2260	2331	2402	2473	
13	2544	2615	2686	2757	2828	2899	2970	3041	3112	3183	
14	3254	3325	3396	3467	3538	3609	3681	3752	3823	3894	
15	3965	4036	4107	4178	4249	4320	4391	4462	4533	4604	
16	4675	4746	4817	4888	4959	5030	5101	5172	5243	5314	
17	5385	5456	5527	5598	5669	5740	5811	5882	5953	6024	
18	6095	6166	6237	6308	6379	6450	6521	6592	6663	6734	
19	6805	6876	6946	7017	7088	7159	7230	7301	7372	7443	
6120	7514	7585	7656	7727	7798	7869	7940	8011	8082	8153	
21	8224	8295	8366	8437	8508	8579	8649	8720	8791	8862	
22	8933	9004	9075	9146	9217	9288	9359	9430	9501	9572	
23	9643	9714	9784	9855	9926	9997	0068	0139	0210	0281	
24	787 0352	0423	0494	0565	0635	0706	0777	0848	0919	0990	
25	1061	1132	1203	1274	1345	1415	1486	1557	1628	1699	
26	1770	1841	1912	1983	2053	2124	2195	2266	2337	2408	
27	2479	2550	2621	2691	2762	2833	2904	2975	3046	3117	
28	3188	3258	3329	3400	3471	3542	3613	3684	3754	3825	
29	3896	3967	4038	4109	4180	4250	4321	4392	4463	4534	
6130	4605	4676	4746	4817	4888	4959	5030	5101	5171	5242	
31	5313	5384	5455	5526	5596	5667	5738	5809	5880	5951	71 1 7.1 2 14.2 3 21.3 4 28.4 5 35.5 6 42.6 7 49.7 8 56.8 9 63.9
32	6021	6092	6163	6234	6305	6376	6446	6517	6588	6659	
33	6730	6800	6871	6942	7013	7084	7155	7225	7296	7367	
34	7438	7509	7579	7650	7721	7792	7863	7933	8004	8075	
35	8146	8216	8287	8358	8429	8500	8570	8641	8712	8783	
36	8854	8924	8995	9066	9137	9207	9278	9349	9420	9490	
37	9561	9632	9703	9774	9844	9915	9986	0057	0127	0198	
38	788 0269	0340	0410	0481	0552	0623	0693	0764	0835	0906	
39	0976	1047	1118	1189	1259	1330	1401	1472	1542	1613	
6140	1684	1754	1825	1896	1967	2037	2108	2179	2250	2320	
41	2391	2462	2532	2603	2674	2745	2815	2886	2957	3027	
42	3098	3169	3240	3310	3381	3452	3522	3593	3664	3734	
43	3805	3876	3947	4017	4088	4159	4229	4300	4371	4441	
44	4512	4583	4653	4724	4795	4865	4936	5007	5078	5148	
45	5219	5290	5360	5431	5502	5572	5643	5714	5784	5855	
46	5926	5996	6067	6138	6208	6279	6350	6420	6491	6561	
47	6632	6703	6773	6844	6915	6985	7056	7127	7197	7268	
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54	1575̄	1645	1716	1787	1857	1928	1998	2069	2139	2210	
55	2281	2351	2422	2492	2563	2633	2704	2774	2845	2916	
56	2986	3057	3127	3198	3268	3339	3409	3480	3550	3621	
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58	4397	4467	4538	4608	4679	4749	4820	4890	4961	5032	
59	5102	5173	5243	5314	5384	5455̄	5525	5596	5666	5737	
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61	6512	6583	6653	6724	6794	6865̄	6935	7005	7076	7146	
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64	8626	8697	8767	8838	8908	8979	9049	9119	9190	9260	
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66	790 0035	0106	0176	0247	0317	0387	0458	0528	0599	0669	
67	0739	0810	0880	0951	1021	1092	1162	1232	1303	1373	
68	1444	1514	1584	1655̄	1725	1796	1866	1936	2007	2077	
69	2148	2218	2288	2359	2429	2500	2570	2640	2711	2781	
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71	3555	3626	3696	3767	3837	3907	3978	4048	4118	4189	
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73	4963	5033	5103	5174	5244	5315̄	5385̄	5455	5526	5596	
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76	7073	7143	7214	7284	7354	7424	7495̄	7565	7635	7706	
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79	9182	9252	9323	9393	9463	9533	9604	9674	9744	9814	
6180	9885̄	9955	0̄025	0̄096	0̄166	0̄236	0̄306	0̄377	0̄447	0̄517	
81	791 0587	0658	0728	0798	0868	0939	1009	1079	1150	1220	
82	1290	1360	1431	1501	1571	1641	1711	1782	1852	1922	
83	1992	2063	2133	2203	2273	2344	2414	2484	2554	2625̄	
84	2695̄	2765	2835	2905	2976	3046	3116	3186	3257	3327	
85	3397	3467	3537	3608	3678	3748	3818	3889	3959	4029	
86	4099	4169	4240	4310	4380	4450	4520	4591	4661	4731	
87	4801	4871	4942	5012	5082	5152	5222	5292	5363	5433	
88	5503	5573	5643	5714	5784	5854	5924	5994	6064	6135̄	
89	6205̄	6275̄	6345	6415	6486	6556	6626	6696	6766	6836	
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93	9011	9081	9151	9221	9291	9361	9432	9502	9572	9642	
94	9712	9782	9852	9922	9992	0̄063	0̄133	0̄203	0̄273	0̄343	
95	792 0413	0483	0553	0623	0694	0764	0834	0904	0974	1044	
96	1114	1184	1254	1324	1394	1465̄	1535̄	1605̄	1675̄	1745̄	
97	1815̄	1885	1955	2025	2095	2165	2235	2306	2376	2446	
98	2516	2586	2656	2726	2796	2866	2936	3006	3076	3146	
99	3216	3286	3356	3427	3497	3567	3637	3707	3777	3847	
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02	5318	5388	5458	5528	5598	5668	5738	5808	5878	5948	
03	6018	6088	6158	6228	6298	6368	6438	6508	6578	6648	
04	6718	6788	6858	6928	6998	7068	7138	7208	7278	7348	
05	7418	7488	7558	7628	7698	7768	7838	7908	7978	8048	
06	8118	8188	8258	8328	8398	8468	8538	8608	8678	8747	
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08	9517	9587	9657	9727	9797	9867	9937	0̄007	0̄077	0̄147	
09	793 0217	0287	0356	0426	0496	0566	0636	0706	0776	0846	
6210	0916	0986	1056	1126	1196	1266	1336	1406	1475	1545	
11	1615	1685	1755	1825	1895̄	1965̄	2035̄	2105̄	2175̄	2245̄	71 1 7.1 2 14.2 3 21.3 4 28.4 5 35.5 6 42.6 7 49.7 8 56.8 9 63.9
12	2314	2384	2454	2524	2594	2664	2734	2804	2874	2944	
13	3014	3083	3153	3223	3293	3363	3433	3503	3573	3643	
14	3712	3782	3852	3922	3992	4062	4132	4202	4272	4341	
15	4411	4481	4551	4621	4691	4761	4831	4900	4970	5040	
16	5110	5180	5250	5320	5390	5459	5529	5599	5669	5739	
17	5809	5879	5948	6018	6088	6158	6228	6298	6367	6437	
18	6507	6577	6647	6717	6787	6856	6926	6996	7066	7136	
19	7206	7275	7345	7415	7485̄	7555̄	7625̄	7694	7764	7834	
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22	9300	9370	9440	9509	9579	9649	9719	9789	9858	9928	
23	9998	0̄068	0̄138	0̄207	0̄277	0̄347	0̄417	0̄487	0̄556	0̄626	
24	794 0696	0766	0835	0905	0975̄	1045̄	1114	1184	1254	1324	
25	1394	1463	1533	1603	1673	1742	1812	1882	1952	2021	
26	2091	2161	2231	2300	2370	2440	2510	2579	2649	2719	
27	2789	2858	2928	2998	3068	3137	3207	3277	3347	3416	
28	3486	3556	3626	3695	3765̄	3835̄	3904	3974	4044	4114	
29	4183	4253	4323	4392	4462	4532	4602	4671	4741	4811	
6230	4880	4950	5020	5090	5159	5229	5299	5368	5438	5508	
31	5578	5647	5717	5787	5856	5926	5996	6065	6135	6205̄	70 1 7.0 2 14.0 3 21.0 4 28.0 5 35.0 6 42.0 7 49.0 8 56.0 9 63.0
32	6274	6344	6414	6484	6553	6623	6693	6762	6832	6902	
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35	8365̄	8434	8504	8574	8643	8713	8782	8852	8922	8991	
36	9061	9131	9200	9270	9340	9409	9479	9549	9618	9688	
37	9757	9827	9897	9966	0̄036	0̄106	0̄175	0̄245̄	0̄314	0̄384	
38	795 0454	0523	0593	0663	0732	0802	0871	0941	1011	1080	
39	1150	1219	1289	1359	1428	1498	1567	1637	1707	1776	
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41	2542	2611	2681	2751	2820	2890	2959	3029	3098	3168	
42	3238	3307	3377	3446	3516	3586	3655	3725̄	3794	3864	
43	3933	4003	4072	4142	4212	4281	4351	4420	4490	4559	
44	4629	4698	4768	4838	4907	4977	5046	5116	5185	5255̄	
45	5324	5394	5464	5533	5603	5672	5742	5811	5881	5950	
46	6020	6089	6159	6228	6298	6367	6437	6506	6576	6646	
47	6715	6785̄	6854	6924	6993	7063	7132	7202	7271	7341	
48	7410	7480	7549	7619	7688	7758	7827	7897	7966	8036	
49	8105	8175̄	8244	8314	8383	8453	8522	8592	8661	8731	
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51	9495̄	9564	9634	9703	9773	9842	9912	9981	0̄051	0̄120	
52	796 0190	0259	0329	0398	0468	0537	0606	0676	0745	0815̄	
53	0884	0954	1023	1093	1162	1232	1301	1370	1440	1509	
54	1579	1648	1718	1787	1857	1926	1995	2065̄	2134	2204	
55	2273	2343	2412	2481	2551	2620	2690	2759	2829	2898	
56	2967	3037	3106	3176	3245	3314	3384	3453	3523	3592	
57	3662	3731	3800	3870	3939	4009	4078	4147	4217	4286	
58	4356	4425̄	4494	4564	4633	4703	4772	4841	4911	4980	
59	5050	5119	5188	5258	5327	5396	5466	5535	5605̄	5674	
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61	6437	6506	6576	6645	6714	6784	6853	6923	6992	7061	
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63	7824	7893	7963	8032	8101	8171	8240	8309	8379	8448	
64	8517	8587	8656	8725	8795̄	8864	8933	9003	9072	9141	
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66	9904	9973	0̄043	0̄112	0̄181	0̄250	0̄320	0̄389	0̄458	0̄528	
67	797 0597	0666	0736	0805̄	0874	0943	1013	1082	1151	1221	
68	1290	1359	1428	1498	1567	1636	1706	1775̄	1844	1913	
69	1983	2052	2121	2191	2260	2329	2398	2468	2537	2606	
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71	3368	3437	3507	3576	3645	3714	3784	3853	3922	3991	
72	4060	4130	4199	4268	4337	4407	4476	4545	4614	4684	
73	4753	4822	4891	4961	5030	5099	5168	5237	5307	5376	
74	5445	5514	5584	5653	5722	5791	5860	5930	5999	6068	
75	6137	6207	6276	6345̄	6414	6483	6553	6622	6691	6760	
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77	7521	7590	7660	7729	7798	7867	7936	8006	8075̄	8144	
78	8213	8282	8351	8421	8490	8559	8628	8697	8766	8836	
79	8905̄	8974	9043	9112	9181	9251	9320	9389	9458	9527	
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81	798 0288	0357	0426	0495	0565̄	0634	0703	0772	0841	0910	
82	0979	1048	1118	1187	1256	1325̄	1394	1463	1532	1601	
83	1671	1740	1809	1878	1947	2016	2085	2154	2224	2293	
84	2362	2431	2500	2569	2638	2707	2776	2846	2915̄	2984	
85	3053	3122	3191	3260	3329	3398	3467	3536	3606	3675̄	
86	3744	3813	3882	3951	4020	4089	4158	4227	4296	4366	
87	4435̄	4504	4573	4642	4711	4780	4849	4918	4987	5056	
88	5125	5194	5263	5333	5402	5471	5540	5609	5678	5747	
89	5816	5885	5954	6023	6092	6161	6230	6299	6368	6437	
6290	6506	6575	6645̄	6714	6783	6852	6921	6990	7059	7128	
91	7197	7266	7335̄	7404	7473	7542	7611	7680	7749	7818	
92	7887	7956	8025	8094	8163	8232	8301	8370	8439	8508	
93	8577	8646	8715	8784	8853	8922	8991	9060	9129	9198	
94	9267	9336	9405	9474	9543	9612	9681	9750	9819	9888	
95	9957	0̄026	0̄095	0̄164	0̄233	0̄302	0̄371	0̄440	0̄509	0̄578	
96	799 0647	0716	0785	0854	0923	0992	1061	1130	1199	1268	
97	1337	1406	1475̄	1544	1613	1682	1751	1820	1889	1958	
98	2027	2096	2164	2233	2302	2371	2440	2509	2578	2647	
99	2716	2785	2854	2923	2992	3061	3130	3199	3268	3337	
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02	4784	4853	4922	4991	5060	5129	5197	5266	5335	5404	
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04	6162	6231	6300	6369	6438	6506	6575	6644	6713	6782	
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06	7540	7609	7677	7746	7815	7884	7953	8022	8091	8159	
07	8228	8297	8366	8435̄	8504	8573	8641	8710	8779	8848	
08	8917	8986	9055̄	9123	9192	9261	9330	9399	9468	9536	
09	9605	9674	9743	9812	9881	9949	0̄018	0̄087	0̄156	0̄225̄	
6310	800 0294	0362	0431	0500	0569	0638	0707	0775	0844	0913	
11	0982	1051	1119	1188	1257	1326	1395̄	1463	1532	1601	69
12	1670	1739	1808	1876	1945	2014	2083	2152	2220	2289	1 | 6.9
13	2358	2427	2495	2564	2633	2702	2771	2839	2908	2977	2 | 13.8
14	3046	3115̄	3183	3252	3321	3390	3458	3527	3596	3665̄	3 | 20.7
15	3734	3802	3871	3940	4009	4077	4146	4215̄	4284	4352	4 | 27.6
16	4421	4490	4559	4627	4696	4765	4834	4903	4971	5040	5 | 34.5
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19	6484	6552	6621	6690	6758	6827	6896	6965̄	7033	7102	8 | 55.2
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21	7858	7927	7995	8064	8133	8201	8270	8339	8408	8476	
22	8545̄	8614	8682	8751	8820	8888	8957	9026	9094	9163	
23	9232	9301	9369	9438	9507	9575	9644	9713	9781	9850	
24	9919	9987	0̄056	0̄125̄	0̄193	0̄262	0̄331	0̄399	0̄468	0̄537	
25	801 0605	0674	0743	0811	0880	0949	1017	1086	1155̄	1223	
26	1292	1361	1429	1498	1566	1635	1704	1772	1841	1910	
27	1978	2047	2116	2184	2253	2322	2390	2459	2527	2596	
28	2665̄	2733	2802	2871	2939	3008	3076	3145	3214	3282	
29	3351	3420	3488	3557	3625	3694	3763	3831	3900	3968	
6330	4037	4106	4174	4243	4312	4380	4449	4517	4586	4655̄	
31	4723	4792	4860	4929	4998	5066	5135̄	5203	5272	5340	68
32	5409	5478	5546	5615̄	5683	5752	5821	5889	5958	6026	1 | 6.8
33	6095̄	6163	6232	6301	6369	6438	6506	6575̄	6643	6712	2 | 13.6
34	6781	6849	6918	6986	7055̄	7123	7192	7261	7329	7398	3 | 20.4
35	7466	7535̄	7603	7672	7740	7809	7878	7946	8015̄	8083	4 | 27.2
36	8152	8220	8289	8357	8426	8494	8563	8631	8700	8769	5 | 34.0
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38	9522	9591	9659	9728	9796	9865̄	9933	0̄002	0̄070	0̄139	7 | 47.6
39	802 0208	0276	0345̄	0413	0482	0550	0619	0687	0756	0824	8 | 54.4
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41	1578	1646	1715̄	1783	1851	1920	1988	2057	2125	2194	
42	2262	2331	2399	2468	2536	2605̄	2673	2742	2810	2879	
43	2947	3016	3084	3153	3221	3289	3358	3426	3495̄	3563	
44	3632	3700	3769	3837	3906	3974	4042	4111	4179	4248	
45	4316	4385̄	4453	4522	4590	4658	4727	4795	4864	4932	
46	5001	5069	5138	5206	5274	5343	5411	5480	5548	5617	
47	5685̄	5753	5822	5890	5959	6027	6096	6164	6232	6301	
48	6369	6438	6506	6574	6643	6711	6780	6848	6916	6985̄	
49	7053	7122	7190	7258	7327	7395	7464	7532	7600	7669	
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51	8421	8490	8558	8626	8695̄	8763	8831	8900	8968	9037	
52	9105̄	9173	9242	9310	9378	9447	9515	9583	9652	9720	
53	9789	9857	9925	9994	0̄062	0̄130	0̄199	0̄267	0̄335	0̄404	
54	803 0472	0540	0609	0677	0745	0814	0882	0951	1019	1087	
55	1156	1224	1292	1361	1429	1497	1566	1634	1702	1771	
56	1839	1907	1976	2044	2112	2181	2249	2317	2385	2454	
57	2522	2590	2659	2727	2795	2864	2932	3000	3069	3137	
58	3205	3274	3342	3410	3478	3547	3615	3683	3752	3820	
59	3888	3957	4025̄	4093	4161	4230	4298	4366	4435̄	4503	
6360	4571	4639	4708	4776	4844	4913	4981	5049	5117	5186	
61	5254	5322	5391	5459	5527	5595	5664	5732	5800	5868	68 1 6.8 2 13.6 3 20.4 4 27.2 5 34.0 6 40.8 7 47.6 8 54.4 9 61.2
62	5937	6005̄	6073	6141	6210	6278	6346	6414	6483	6551	
63	6619	6687	6756	6824	6892	6960	7029	7097	7165	7233	
64	7302	7370	7438	7506	7575̄	7643	7711	7779	7848	7916	
65	7984	8052	8121	8189	8257	8325	8393	8462	8530	8598	
66	8666	8735̄	8803	8871	8939	9007	9076	9144	9212	9280	
67	9348	9417	9485̄	9553	9621	9690	9758	9826	9894	9962	
68	804 0031	0099	0167	0235	0303	0372	0440	0508	0576	0644	
69	0712	0781	0849	0917	0985	1053	1122	1190	1258	1326	
6370	1394	1463	1531	1599	1667	1735	1803	1872	1940	2008	
71	2076	2144	2212	2281	2349	2417	2485	2553	2621	2690	
72	2758	2826	2894	2962	3030	3098	3167	3235̄	3303	3371	
73	3439	3507	3575	3644	3712	3780	3848	3916	3984	4052	
74	4121	4189	4257	4325̄	4393	4461	4529	4598	4666	4734	
75	4802	4870	4938	5006	5074	5143	5211	5279	5347	5415̄	
76	5483	5551	5619	5687	5756	5824	5892	5960	6028	6096	
77	6164	6232	6300	6368	6437	6505̄	6573	6641	6709	6777	
78	6845	6913	6981	7049	7118	7186	7254	7322	7390	7458	
79	7526	7594	7662	7730	7798	7866	7934	8003	8071	8139	
6380	8207	8275̄	8343	8411	8479	8547	8615	8683	8751	8819	
81	8887	8956	9024	9092	9160	9228	9296	9364	9432	9500	67 1 6.7 2 13.4 3 20.1 4 26.8 5 33.5 6 40.2 7 46.9 8 53.6 9 60.3
82	9568	9636	9704	9772	9840	9908	9976	0̄044	0̄112	0̄180	
83	805 0248	0316	0385̄	0453	0521	0589	0657	0725̄	0793	0861	
84	0929	0997	1065̄	1133	1201	1269	1337	1405̄	1473	1541	
85	1609	1677	1745	1813	1881	1949	2017	2085	2153	2221	
86	2289	2357	2425	2493	2561	2629	2697	2765	2833	2901	
87	2969	3037	3105	3173	3241	3309	3377	3445	3513	3581	
88	3649	3717	3785	3853	3921	3989	4057	4125̄	4193	4261	
89	4329	4397	4465̄	4533	4601	4669	4737	4805̄	4873	4941	
6390	5009	5077	5145̄	5212	5280	5348	5416	5484	5552	5620	
91	5688	5756	5824	5892	5960	6028	6096	6164	6232	6300	
92	6368	6436	6504	6571	6639	6707	6775	6843	6911	6979	
93	7047	7115̄	7183	7251	7319	7387	7455̄	7523	7590	7658	
94	7726	7794	7862	7930	7998	8066	8134	8202	8270	8338	
95	8405	8473	8541	8609	8677	8745	8813	8881	8949	9017	
96	9085̄	9152	9220	9288	9356	9424	9492	9560	9628	9696	
97	9764	9831	9899	9967	0̄035	0̄103	0̄171	0̄239	0̄307	0̄374	
98	806 0442	0510	0578	0646	0714	0782	0850	0917	0985	1053	
99	1121	1189	1257	1325̄	1393	1460	1528	1596	1664	1732	
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01	2478	2546	2614	2682	2750	2817	2885	2953	3021	3089	
02	3157	3225̄	3292	3360	3428	3496	3564	3632	3699	3767	
03	3835	3903	3971	4038	4106	4174	4242	4310	4378	4445	
04	4513	4581	4649	4717	4784	4852	4920	4988	5056	5124	
05	5191	5259	5327	5395̄	5463	5530	5598	5666	5734	5802	
06	5869	5937	6005̄	6073	6141	6208	6276	6344	6412	6479	
07	6547	6615	6683	6751	6818	6886	6954	7022	7089	7157	
08	7225	7293	7361	7428	7496	7564	7632	7699	7767	7835̄	
09	7903	7970	8038	8106	8174	8242	8309	8377	8445̄	8513	
6410	8580	8648	8716	8784	8851	8919	8987	9055̄	9122	9190	
11	9258	9326	9393	9461	9529	9596	9664	9732	9800	9867	68 1 6.8 2 13.6 3 20.4 4 27.2 5 34.0 6 40.8 7 47.6 8 54.4 9 61.2
12	9935	0̄003	0̄071	0̄138	0̄206	0̄274	0̄342	0̄409	0̄477	0̄545̄	
13	807 0612	0680	0748	0816	0883	0951	1019	1086	1154	1222	
14	1290	1357	1425̄	1493	1560	1628	1696	1764	1831	1899	
15	1967	2034	2102	2170	2237	2305	2373	2440	2508	2576	
16	2644	2711	2779	2847	2914	2982	3050	3117	3185	3253	
17	3320	3388	3456	3523	3591	3659	3726	3794	3862	3929	
18	3997	4065̄	4132	4200	4268	4335	4403	4471	4538	4606	
19	4674	4741	4809	4877	4944	5012	5080	5147	5215̄	5283	
6420	5350	5418	5486	5553	5621	5689	5756	5824	5891	5959	
21	6027	6094	6162	6230	6297	6365̄	6432	6500	6568	6635	
22	6703	6771	6838	6906	6974	7041	7109	7176	7244	7312	
23	7379	7447	7514	7582	7650	7717	7785̄	7853	7920	7988	
24	8055	8123	8191	8258	8326	8393	8461	8529	8596	8664	
25	8731	8799	8867	8934	9002	9069	9137	9204	9272	9340	
26	9407	9475̄	9542	9610	9678	9745	9813	9880	9948	0̄015	
27	808 0083	0151	0218	0286	0353	0421	0488	0556	0624	0691	
28	0759	0826	0894	0961	1029	1096	1164	1232	1299	1367	
29	1434	1502	1569	1637	1704	1772	1840	1907	1975̄	2042	
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31	2785	2853	2920	2988	3055	3123	3190	3258	3325	3393	67 1 6.7 2 13.4 3 20.1 4 26.8 5 33.5 6 40.2 7 46.9 8 53.6 9 60.3
32	3460	3528	3595	3663	3730	3798	3865	3933	4000	4068	
·33	4136	4203	4271	4338	4406	4473	4541	4608	4676	4743	
34	4811	4878	4946	5013	5081	5148	5216	5283	5351	5418	
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36	6160	6228	6295	6363	6430	6498	6565	6633	6700	6768	
37	6835	6903	6970	7037	7105̄	7172	7240	7307	7375̄	7442	
38	7510	7577	7645̄	7712	7780	7847	7914	7982	8049	8117	
39	8184	8252	8319	8387	8454	8521	8589	8656	8724	8791	
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41	9533	9600	9668	9735	9803	9870	9938	0̄005̄	0̄072	0̄140	
42	809 0207	0275̄	0342	0409	0477	0544	0612	0679	0747	0814	
43	0881	0949	1016	1084	1151	1218	1286	1353	1421	1488	
44	1555	1623	1690	1757	1825̄	1892	1960	2027	2094	2162	
45	2229	2297	2364	2431	2499	2566	2634	2701	2768	2836	
46	2903	2970	3038	3105	3173	3240	3307	3375̄	3442	3509	
47	3577	3644	3711	3779	3846	3914	3981	4048	4116	4183	
48	4250	4318	4385̄	4452	4520	4587	4654	4722	4789	4856	
49	4924	4991	5058	5126	5193	5260	5328	5395	5462	5530	
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6450	809 5597	5664	5732	5799	5866	5934	6001	6068	6136	6203	
51	6270	6338	6405	6472	6540	6607	6674	6742	6809	6876	
52	6944	7011	7078	7146	7213	7280	7347	7415	7482	7549	
53	7617	7684	7751	7819	7886	7953	8020	8088	8155	8222	
54	8290	8357	8424	8491	8559	8626	8693	8761	8828	8895	
55	8962	9030	9097	9164	9232	9299	9366	9433	9501	9568	
56	9635	9702	9770	9837	9904	9972	0̄039	0̄106	0̄173	0̄241	
57	810 0308	0375	0442	0510	0577	0644	0711	0779	0846	0913	
58	0980	1048	1115	1182	1249	1317	1384	1451	1518	1586	
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6460	2325	2392	2460	2527	2594	2661	2729	2796	2863	2930	
61	2997	3065	3132	3199	3266	3333	3401	3468	3535	3602	67
62	3670	3737	3804	3871	3938	4006	4073	4140	4207	4274	1 6.7
63	4342	4409	4476	4543	4610	4678	4745	4812	4879	4946	2 13.4
64	5013	5081	5148	5215	5282	5349	5417	5484	5551	5618	3 20.1
65	5685	5752	5820	5887	5954	6021	6088	6156	6223	6290	4 26.8
66	6357	6424	6491	6558	6626	6693	6760	6827	6894	6961	5 33.5 6 40.2
67	7029	7096	7163	7230	7297	7364	7432	7499	7566	7633	7 46.9
68	7700	7767	7834	7902	7969	8036	8103	8170	8237	8304	8 53.6
69	8372	8439	8506	8573	8640	8707	8774	8841	8909	8976	9 60.3
6470	9043	9110	9177	9244	9311	9378	9446	9513	9580	9647	
71	9714	9781	9848	9915	9982	0̄0̄50	0̄117	0̄184	0̄751	0̄318	
72	811 0385	0452	0519	0586	0653	0721	0788	0855	0922	0989	
73	1056	1123	1190	1257	1324	1392	1459	1526	1593	1660	
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79	5080	5147	5214	5281	5348	5415	5482	5549	5616	5683	
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81	6420	6487	6554	6621	6688	6755	6822	6889	6956	7023	66
82	7090	7157	7224	7291	7358	7425	7492	7559	7626	7693	1 6.6
83	7760	7827	7894	7961	8028	8095	8162	8229	8296	8363	2 13.2
84	8430	8497	8564	8631	8698	8765	8832	8899	8966	9033	3 19.8
85	9100	9167	9234	9301	9368	9435	9502	9569	9636	9702	4 26.4
86	9769	9836	9903	9970	0̄037	0̄104	0̄171	0̄238	0̄305	0̄372	5 33.0 6 39.6
87	812 0439	0506	0573	0640	0707	0774	0841	0908	0975	1041	7 46.2
88	1108	1175	1242	1309	1376	1443	1510	1577	1644	1711	8 52.8
89	1778	1845	1912	1979	2045	2112	2179	2246	2313	2380	9 59.4
6490	2447	2514	2581	2648	2715	2782	2848	2915	2982	3049	
91	3116	3183	3250	3317	3384	3451	3518	3584	3651	3718	
92	3785	3852	3919	3986	4053	4120	4186	4253	4320	4387	
93	4454	4521	4588	4655	4722	4788	4855	4922	4989	5056	
94	5123	5190	5257	5323	5390	5457	5524	5591	5658	5725	
95	5792	5858	5925	5992	6059	6126	6193	6260	6326	6393	
96	6460	6527	6594	6661	6728	6794	6861	6928	6995	7062	
97	7129	7196	7262	7329	7396	7463	7530	7597	7663	7730	
98	7797	7864	7931	7998	8064	8131	8198	8265	8332	8399	
99	8465	8532	8599	8666	8733	8799	8866	8933	9000	9067	
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01	9802	9868	9935	0̄002	0̄069	0̄136	0̄202	0̄269	0̄336	0̄403	
02	813 0470	0536	0603	0670	0737	0804	0870	0937	1004	1071	
03	1138	1204	1271	1338	1405̄	1471	1538	1605	1672	1739	
04	1805	1872	1939	2006	2072	2139	2206	2273	2339	2406	
05	2473	2540	2607	2673	2740	2807	2874	2940	3007	3074	
06	3141	3207	3274	3341	3408	3474	3541	3608	3675̄	3741	
07	3808	3875̄	3942	4008	4075	4142	4209	4275	4342	4409	
08	4475	4542	4609	4676	4742	4809	4876	4943	5009	5076	
09	5143	5209	5276	5343	5410	5476	5543	5610	5676	5743	
6510	5810	5877	5943	6010	6077	6143	6210	6277	6344	6410	
11	6477	6544	6610	6677	6744	6810	6877	6944	7011	7077	67 1 6.7 2 13.4 3 20.1 4 26.8 5 33.5 6 40.2 7 46.9 8 53.6 9 60.3
12	7144	7211	7277	7344	7411	7477	7544	7611	7677	7744	
13	7811	7877	7944	8011	8077	8144	8211	8278	8344	8411	
14	8478	8544	8611	8678	8744	8811	8878	8944	9011	9078	
15	9144	9211	9278	9344	9411	9477	9544	9611	9677	9744	
16	9811	9877	9944	0̄011	0̄077	0̄144	0̄211	0̄277	0̄344	0̄411	
17	814 0477	0544	0610	0677	0744	0810	0877	0944	1010	1077	
18	1144	1210	1277	1343	1410	1477	1543	1610	1677	1743	
19	1810	1876	1943	2010	2076	2143	2210	2276	2343	2409	
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21	3142	3209	3275	3342	3408	3475̄	3542	3608	3675̄	3741	
22	3808	3875̄	3941	4008	4074	4141	4207	4274	4341	4407	
23	4474	4540	4607	4674	4740	4807	4873	4940	5006	5073	
24	5140	5206	5273	5339	5406	5472	5539	5605	5672	5739	
25	5805	5872	5938	6005̄	6071	6138	6204	6271	6338	6404	
26	6471	6537	6604	6670	6737	6803	6870	6937	7003	7070	
27	7136	7203	7269	7336	7402	7469	7535	7602	7668	7735̄	
28	7801	7868	7935̄	8001	8068	8134	8201	8267	8334	8400	
29	8467	8533	8600	8666	8733	8799	8866	8932	8999	9065	
6530	9132	9198	9265̄	9331	9398	9464	9531	9597	9664	9730	
31	9797	9863	9930	9996	0̄063	0̄129	0̄196	0̄262	0̄329	0̄395	66 1 6.6 2 13.2 3 19.8 4 26.4 5 33.0 6 39.6 7 46.2 8 52.8 9 59.4
32	815 0462	0528	0595̄	0661	0728	0794	0861	0927	0994	1060	
33	1127	1193	1260	1326	1392	1459	1525	1592	1658	1725̄	
34	1791	1858	1924	1991	2057	2124	2190	2257	2323	2389	
35	2456	2522	2589	2655	2722	2788	2855̄	2921	2988	3054	
36	3120	3187	3253	3320	3386	3453	3519	3586	3652	3718	
37	3785̄	3851	3918	3984	4051	4117	4183	4250	4316	4383	
38	4449	4516	4582	4648	4715̄	4781	4848	4914	4981	5047	
39	5113	5180	5246	5313	5379	5445	5512	5578	5645̄	5711	
6540	5777	5844	5910	5977	6043	6109	6176	6242	6309	6375	
41	6441	6508	6574	6641	6707	6773	6840	6906	6973	7039	
42	7105	7172	7238	7305̄	7371	7437	7504	7570	7636	7703	
43	7769	7836	7902	7968	8035̄	8101	8167	8234	8300	8367	
44	8433	8499	8566	8632	8698	8765̄	8831	8897	8964	9030	
45	9097	9163	9229	9296	9362	9428	9495̄	9561	9627	9694	
46	9760	9826	9893	9959	0̄025	0̄092	0̄158	0̄224	0̄291	0̄357	
47	816 0423	0490	0556	0622	0689	0755	0821	0888	0954	1020	
48	1087	1153	1219	1286	1352	1418	1485̄	1551	1617	1684	
49	1750	1816	1883	1949	2015	2081	2148	2214	2280	2347	
6550	2413	2479	2546	2612	2678	2745̄	2811	2877	2943	3010	
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6550	816 2413	2479	2546	2612	2678	2745̄	2811	2877	2943	3010	
51	3076	3142	3209	3275̄	3341	3407	3474	3540	3606	3673	
52	3739	3805	3871	3938	4004	4070	4137	4203	4269	4335	
53	4402	4468	4534	4600	4667	4733	4799	4866	4932	4998	
54	5064	5131	5197	5263	5329	5396	5462	5528	5594	5661	
55	5727	5793	5859	5926	5992	6058	6124	6191	6257	6323	
56	6389	6456	6522	6588	6654	6721	6787	6853	6919	6986	
57	7052	7118	7184	7251	7317	7383	7449	7515	7582	7648	
58	7714	7780	7847	7913	7979	8045	8111	8178	8244	8310	
59	8376	8443	8509	8575̄	8641	8707	8774	8840	8906	8972	
6560	9038	9105̄	9171	9237	9303	9369	9436	9502	9568	9634	
61	9700	9767	9833	9899	9965	0̄031	0̄098	0̄164	0̄230	0̄296	66
62	817 0362	0428	0495̄	0561	0627	0693	0759	0826	0892	0958	1 6.6
63	1024	1090	1156	1223	1289	1355̄	1421	1487	1553	1620	2 13.2
64	1686	1752	1818	1884	1950	2017	2083	2149	2215̄	2281	3 19.8
65	2347	2413	2480	2546	2612	2678	2744	2810	2876	2943	4 26.4
66	3009	3075̄	3141	3207	3273	3339	3406	3472	3538	3604	5 33.0
67	3670	3736	3802	3869	3935̄	4001	4067	4133	4199	4265	6 39.6
68	4331	4398	4464	4530	4596	4662	4728	4794	4860	4927	7 46.2
69	4993	5059	5125̄	5191	5257	5323	5389	5455	5521	5588	8 52.8
6570	5654	5720	5786	5852	5918	5984	6050	6116	6182	6249	9 59.4
71	6315̄	6381	6447	6513	6579	6645	6711	6777	6843	6909	
72	6976	7042	7108	7174	7240	7306	7372	7438	7504	7570	
73	7636	7702	7768	7835̄	7901	7967	8033	8099	8165̄	8231	
74	8297	8363	8429	8495	8561	8627	8693	8759	8825	8892	
75	8958	9024	9090	9156	9222	9288	9354	9420	9486	9552	
76	9618	9684	9750	9816	9882	9948	0̄014	0̄080	0̄146	0̄212	
77	818 0278	0344	0410	0477	0543	0609	0675̄	0741	0807	0873	
78	0939	1005̄	1071	1137	1203	1269	1335	1401	1467	1533	
79	1599	1665̄	1731	1797	1863	1929	1995̄	2061	2127	2193	
6580	2259	2325̄	2391	2457	2523	2589	2655̄	2721	2787	2853	
81	2919	2985̄	3051	3117	3183	3249	3315̄	3381	3447	3513	65
82	3579	3645̄	3711	3777	3843	3909	3975̄	4041	4107	4173	1 6.5
83	4239	4305̄	4370	4436	4502	4568	4634	4700	4766	4832	2 13.0
84	4898	4964	5030	5096	5162	5228	5294	5360	5426	5492	3 19.5
85	5558	5624	5690	5756	5822	5888	5953	6019	6085	6151	4 26.0
86	6217	6283	6349	6415	6481	6547	6613	6679	6745̄	6811	5 32.5
87	6877	6943	7008	7074	7140	7206	7272	7338	7404	7470	6 39.0
88	7536	7602	7668	7734	7800	7866	7931	7997	8063	8129	7 45.5
89	8195	8261	8327	8393	8459	8525̄	8591	8656	8722	8788	8 52.0
6590	8854	8920	8986	9052	9118	9184	9250	9315	9381	9447	9 58.5
91	9513	9579	9645̄	9711	9777	9843	9908	9974	0̄040	0̄106	
92	819 0172	0238	0304	0370	0436	0501	0567	0633	0699	0765̄	
93	0831	0897	0962	1028	1094	1160	1226	1292	1358	1424	
94	1489	1555	1621	1687	1753	1819	1885̄	1950	2016	2082	
95	2148	2214	2280	2346	2411	2477	2543	2609	2675̄	2741	
96	2806	2872	2938	3004	3070	3136	3202	3267	3333	3399	
97	3465̄	3531	3597	3662	3728	3794	3860	3926	3991	4057	
98	4123	4189	4255̄	4321	4386	4452	4518	4584	4650	4715	
99	4781	4847	4913	4979	5045̄	5110	5176	5242	5308	5374	
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6600	819 5439	5505	5571	5637	5703	5768	5834	5900	5966	6032	
01	6097	6163	6229	6295	6360	6426	6492	6558	6624	6689	
02	6755	6821	6887	6953	7018	7084	7150	7216	7281	7347	
03	7413	7479	7545	7610	7676	7742	7808	7873	7939	8005	
04	8071	8136	8202	8268	8334	8399	8465	8531	8597	8662	
05	8728	8794	8860	8925	8991	9057	9123	9188	9254	9320	
06	9386	9451	9517	9583	9649	9714	9780	9846	9912	9977	
07	820 0043	0109	0175	0240	0306	0372	0437	0503	0569	0635	
08	0700	0766	0832	0898	0963	1029	1095	1160	1226	1292	
09	1358	1423	1489	1555	1620	1686	1752	1817	1883	1949	
6610	2015	2080	2146	2212	2277	2343	2409	2474	2540	2606	
11	2672	2737	2803	2869	2934	3000	3066	3131	3197	3263	66
12	3328	3394	3460	3525	3591	3657	3723	3788	3854	3920	1 6.6
13	3985	4051	4117	4182	4248	4314	4379	4445	4511	4576	2 13.2
14	4642	4708	4773	4839	4905	4970	5036	5102	5167	5233	3 19.8
15	5298	5364	5430	5495	5561	5627	5692	5758	5824	5889	4 26.4
16	5955	6021	6086	6152	6218	6283	6349	6414	6480	6546	5 33.0 6 39.6
17	6611	6677	6743	6808	6874	6939	7005	7071	7136	7202	7 46.2
18	7268	7333	7399	7464	7530	7596	7661	7727	7793	7858	8 52.8
19	7924	7989	8055	8121	8186	8252	8317	8383	8449	8514	9 59.4
6620	8580	8645	8711	8777	8842	8908	8973	9039	9105	9170	
21	9236	9301	9367	9433	9498	9564	9629	9695	9761	9826	
22	9892	9957	0̄023	0̄089	0̄154	0̄220	0̄285	0̄351	0̄416	0̄482	
23	821 0548	0613	0679	0744	0810	0875	0941	1007	1072	1138	
24	1203	1269	1334	1400	1465	1531	1597	1662	1728	1793	
25	1859	1924	1990	2055	2121	2187	2252	2318	2383	2449	
26	2514	2580	2645	2711	2776	2842	2908	2973	3039	3104	
27	3170	3235	3301	3366	3432	3497	3563	3628	3694	3759	
28	3825	3891	3956	4022	4087	4153	4218	4284	4349	4415	
29	4480	4546	4611	4677	4742	4808	4873	4939	5004	5070	
6630	5135	5201	5266	5332	5397	5463	5528	5594	5659	5725	
31	5790	5856	5921	5987	6052	6118	6183	6249	6314	6380	65
32	6445	6511	6576	6642	6707	6773	6838	6904	6969	7034	1 6.5
33	7100	7165	7231	7296	7362	7427	7493	7558	7624	7689	2 13.0 3 19.5
34	7755	7820	7886	7951	8017	8082	8147	8213	8278	8344	4 26.0
35	8409	8475	8540	8606	8671	8737	8802	8867	8933	8998	5 32.5
36	9064	9129	9195	9260	9326	9391	9456	9522	9587	9653	6 39.0
37	9718	9784	9849	9914	9980	0̄045	0̄111	0̄176	0̄242	0̄307	7 45.5
38	822 0372	0438	0503	0569	0634	0700	0765	0830	0896	0961	8 52.0
39	1027	1092	1158	1223	1288	1354	1419	1485	1550	1615	9 58.5
6640	1681	1746	1812	1877	1942	2008	2073	2139	2204	2269	
41	2335	2400	2466	2531	2596	2662	2727	2793	2858	2923	
42	2989	3054	3119	3185	3250	3316	3381	3446	3512	3577	
43	3643	3708	3773	3839	3904	3969	4035	4100	4166	4231	
44	4296	4362	4427	4492	4558	4623	4688	4754	4819	4884	
45	4950	5015	5081	5146	5211	5277	5342	5407	5473	5538	
46	5603	5669	5734	5799	5865	5930	5995	6061	6126	6191	
47	6257	6322	6387	6453	6518	6583	6649	6714	6779	6845	
48	6910	6975	7041	7106	7171	7237	7302	7367	7433	7498	
49	7563	7629	7694	7759	7825	7890	7955	8021	8086	8151	
6650	8216	8282	8347	8412	8478	8543	8608	8674	8739	8804	
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6650	822 8216	8282	8347	8412	8478	8543	8608	8674	8739	8804	
51	8869	8935̄	9000	9065	9131	9196	9261	9327	9392	9457	
52	9522	9588	9653	9718	9784	9849	9914	9979	0̄045̄	0̄110	
53	823 0175	0241	0306	0371	0436	0502	0567	0632	0697	0763	
54	0828	0893	0958	1024	1089	1154	1220	1285̄	1350	1415	
55	1481	1546	1611	1676	1742	1807	1872	1937	2003	2068	
56	2133	2198	2264	2329	2394	2459	2525̄	2590	2655	2720	
57	2786	2851	2916	2981	3047	3112	3177	3242	3307	3373	
58	3438	3503	3568	3634	3699	3764	3829	3894	3960	4025̄	
59	4090	4155	4221	4286	4351	4416	4481	4547	4612	4677	
6660	4742	4808	4873	4938	5003	5068	5134	5199	5264	5329	
61	5394	5460	5525̄	5590	5655	5720	5786	5851	5916	5981	
62	6046	6111	6177	6242	6307	6372	6437	6503	6568	6633	
63	6698	6763	6828	6894	6959	7024	7089	7154	7220	7285̄	
64	7350	7415	7480	7545	7611	7676	7741	7806	7871	7936	
65	8002	8067	8132	8197	8262	8327	8392	8458	8523	8588	
66	8653	8718	8783	8849	8914	8979	9044	9109	9174	9239	
67	9305̄	9370	9435̄	9500	9565	9630	9695	9761	9826	9891	
68	9956	0̄021	0̄086	0̄151	0̄216	0̄282	0̄347	0̄412	0̄477	0̄542	
69	824 0607	0672	0737	0803	0868	0933	0998	1063	1128	1193	
6670	1258	1323	1389	1454	1519	1584	1649	1714	1779	1844	
71	1909	1975̄	2040	2105̄	2170	2235̄	2300	2365	2430	2495	
72	2560	2625	2691	2756	2821	2886	2951	3016	3081	3146	
73	3211	3276	3341	3406	3472	3537	3602	3667	3732	3797	
74	3862	3927	3992	4057	4122	4187	4252	4318	4383	4448	
75	4513	4578	4643	4708	4773	4838	4903	4968	5033	5098	
76	5163	5228	5293	5358	5423	5489	5554	5619	5684	5749	
77	5814	5879	5944	6009	6074	6139	6204	6269	6334	6399	
78	6464	6529	6594	6659	6724	6789	6854	6919	6984	7049	
79	7114	7179	7244	7310	7375̄	7440	7505̄	7570	7635̄	7700	
6680	7765̄	7830	7895̄	7960	8025̄	8090	8155̄	8220	8285̄	8350	
81	8415̄	8480	8545̄	8610	8675̄	8740	8805̄	8870	8935̄	9000	
82	9065̄	9130	9195̄	9260	9325̄	9390	9455̄	9520	9585̄	9650	
83	9715̄	9780	9845̄	9910	9975̄	0̄040	0̄105̄	0̄169	0̄234	0̄299	
84	825 0364	0429	0494	0559	0624	0689	0754	0819	0884	0949	
85	1014	1079	1144	1209	1274	1339	1404	1469	1534	1599	
86	1664	1729	1794	1859	1924	1988	2053	2118	2183	2248	
87	2313	2378	2443	2508	2573	2638	2703	2768	2833	2898	
88	2963	3028	3093	3157	3222	3287	3352	3417	3482	3547	
89	3612	3677	3742	3807	3872	3937	4002	4066	4131	4196	
6690	4261	4326	4391	4456	4521	4586	4651	4716	4780	4845	
91	4910	4975	5040	5105	5170	5235̄	5300	5365̄	5430	5494	
92	5559	5624	5689	5754	5819	5884	5949	6014	6078	6143	
93	6208	6273	6338	6403	6468	6533	6598	6662	6727	6792	
94	6857	6922	6987	7052	7117	7181	7246	7311	7376	7441	
95	7506	7571	7636	7700	7765	7830	7895	7960	8025̄	8090	
96	8154	8219	8284	8349	8414	8479	8544	8608	8673	8738	
97	8803	8868	8933	8998	9062	9127	9192	9257	9322	9387	
98	9451	9516	9581	9646	9711	9776	9840	9905	9970	0̄035̄	
99	826 0100	0165̄	0229	0294	0359	0424	0489	0554	0618	0683	
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9	57.6

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02	2044	2109	2174	2239	2303	2368	2433	2498	2563	2627	
03	2692	2757	2822	2887	2951	3016	3081	3146	3210	3275	
04	3340	3405̄	3470	3534	3599	3664	3729	3794	3858	3923	
05	3988	4053	4117	4182	4247	4312	4376	4441	4506	4571	
06	4635	4700	4765	4830	4895̄	4959	5024	5089	5154	5218	
07	5283	5348	5413	5477	5542	5607	5672	5736	5801	5866	
08	5931	5995	6060	6125̄	6190	6254	6319	6384	6448	6513	
09	6578	6643	6707	6772	6837	6902	6966	7031	7096	7160	
6710	7225	7290	7355̄	7419	7484	7549	7614	7678	7743	7808	
11	7872	7937	8002	8067	8131	8196	8261	8325	8390	8455̄	65
12	8519	8584	8649	8714	8778	8843	8908	8972	9037	9102	1 6.5
13	9166	9231	9296	9361	9425	9490	9555̄	9619	9684	9749	2 13.0
14	9813	9878	9943	0̄007	0̄072	0̄137	0̄201	0̄266	0̄331	0̄395	3 19.5
15	827 0460	0525̄	0590	0654	0719	0784	0848	0913	0978	1042	4 26.0
16	1107	1172	1236	1301	1366	1430	1495̄	1560	1624	1689	5 32.5
17	1753	1818	1883	1947	2012	2077	2141	2206	2271	2335	6 39.0
18	2400	2465̄	2529	2594	2659	2723	2788	2852	2917	2982	7 45.5 8 52.0
19	3046	3111	3176	3240	3305̄	3370	3434	3499	3563	3628	9 58.5
6720	3693	3757	3822	3887	3951	4016	4080	4145	4210	4274	
21	4339	4404	4468	4533	4597	4662	4727	4791	4856	4920	
22	4985	5050	5114	5179	5244	5308	5373	5437	5502	5567	
23	5631	5696	5760	5825̄	5889	5954	6019	6083	6148	6212	
24	6277	6342	6406	6471	6535	6600	6665̄	6729	6794	6858	
25	6923	6987	7052	7117	7181	7246	7310	7375̄	7439	7504	
26	7569	7633	7698	7762	7827	7891	7956	8021	8085	8150	
27	8214	8279	8343	8408	8473	8537	8602	8666	8731	8795	
28	8860	8924	8989	9053	9118	9183	9247	9312	9376	9441	
29	9505	9570	9634	9699	9763	9828	9893	9957	0̄022	0̄086	
6730	828 0151	0215	0280	0344	0409	0473	0538	0602	0667	0731	
31	0796	0860	0925̄	0989	1054	1119	1183	1248	1312	1377	64
32	1441	1506	1570	1635̄	1699	1764	1828	1893	1957	2022	1 6.4
33	2086	2151	2215	2280	2344	2409	2473	2538	2602	2667	2 12.8
34	2731	2796	2860	2925̄	2989	3054	3118	3183	3247	3312	3 19.2 4 25.6
35	3376	3440	3505̄	3569	3634	3698	3763	3827	3892	3956	5 32.0
36	4021	4085	4150	4214	4279	4343	4408	4472	4537	4601	6 38.4
37	4665	4730	4794	4859	4923	4988	5052	5117	5181	5246	7 44.8
38	5310	5375̄	5439	5503	5568	5632	5697	5761	5826	5890	8 51.2
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6740	6599	6663	6728	6792	6857	6921	6986	7050	7114	7179	
41	7243	7308	7372	7437	7501	7565	7630	7694	7759	7823	
42	7887	7952	8016	8081	8145	8210	8274	8338	8403	8467	
43	8532	8596	8660	8725̄	8789	8854	8918	8982	9047	9111	
44	9176	9240	9304	9369	9433	9498	9562	9626	9691	9755	
45	9820	9884	9948	0̄013	0̄077	0̄141	0̄206	0̄270	0̄335̄	0̄399	
46	829 0463	0528	0592	0656	0721	0785	0850	0914	0978	1043	
47	1107	1171	1236	1300	1365̄	1429	1493	1558	1622	1686	
48	1751	1815	1879	1944	2008	2073	2137	2201	2266	2330	
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6750	829 3038	3102	3166	3231	3295	3359	3424	3488	3552	3617	
51	3681	3745	3810	3874	3938	4003	4067	4131	4196	4260	
52	4324	4389	4453	4517	4582	4646	4710	4775̄	4839	4903	
53	4967	5032	5096	5160	5225̄	5289	5353	5418	5482	5546	
54	5611	5675̄	5739	5803	5868	5932	5996	6061	6125̄	6189	
55	6254	6318	6382	6446	6511	6575̄	6639	6704	6768	6832	
56	6896	6961	7025̄	7089	7154	7218	7282	7346	7411	7475̄	
57	7539	7603	7668	7732	7796	7861	7925̄	7989	8053	8118	
58	8182	8246	8310	8375̄	8439	8503	8567	8632	8696	8760	
59	8824	8889	8953	9017	9081	9146	9210	9274	9338	9403	
6760	9467	9531	9595	9660	9724	9788	9852	9917	9981	0̄045	
61	830 0109	0174	0238	0302	0366	0431	0495̄	0559	0623	0687	
62	0752	0816	0880	0944	1009	1073	1137	1201	1265	1330	
63	1394	1458	1522	1587	1651	1715̄	1779	1843	1908	1972	
64	2036	2100	2164	2229	2293	2357	2421	2485	2550	2614	
65	2678	2742	2806	2871	2935̄	2999	3063	3127	3192	3256	
66	3320	3384	3448	3512	3577	3641	3705	3769	3833	3898	
67	3962	4026	4090	4154	4218	4283	4347	4411	4475	4539	
68	4604	4668	4732	4796	4860	4924	4988	5053	5117	5181	
69	5245	5309	5373	5438	5502	5566	5630	5694	5758	5823	
6770	5887	5951	6015̄	6079	6143	6207	6272	6336	6400	6464	
71	6528	6592	6656	6721	6785̄	6849	6913	6977	7041	7105	
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73	7811	7875̄	7939	8003	8067	8131	8195	8260	8324	8388	
74	8452	8516	8580	8644	8708	8772	8837	8901	8965̄	9029	
75	9093	9157	9221	9285	9349	9413	9478	9542	9606	9670	
76	9734	9798	9862	9926	9990	0̄054	0̄119	0̄183	0̄247	0̄311	
77	831 0375̄	0439	0503	0567	0631	0695	0759	0823	0887	0952	
78	1016	1080	1144	1208	1272	1336	1400	1464	1528	1592	
79	1656	1720	1784	1849	1913	1977	2041	2105̄	2169	2233	
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81	2937	3001	3066	3130	3194	3258	3322	3386	3450	3514	
82	3578	3642	3706	3770	3834	3898	3962	4026	4090	4154	
83	4218	4282	4346	4410	4474	4538	4602	4666	4730	4794	
84	4858	4922	4986	5050	5114	5178	5242	5306	5371	5435̄	
85	5499	5563	5627	5691	5755̄	5819	5883	5947	6011	6075̄	
86	6139	6203	6267	6331	6395̄	6459	6523	6587	6651	6715̄	
87	6778	6842	6906	6970	7034	7098	7162	7226	7290	7354	
88	7418	7482	7546	7610	7674	7738	7802	7866	7930	7994	
89	8058	8122	8186	8250	8314	8378	8442	8506	8570	8634	
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91	9337	9401	9465	9529	9593	9657	9721	9785̄	9849	9913	
92	9977	0̄041	0̄105̄	0̄169	0̄233	0̄296	0̄360	0̄424	0̄488	0̄552	
93	832 0616	0680	0744	0808	0872	0936	1000	1064	1128	1192	
94	1255	1319	1383	1447	1511	1575	1639	1703	1767	1831	
95	1895̄	1959	2022	2086	2150	2214	2278	2342	2406	2470	
96	2534	2598	2662	2725	2789	2853	2917	2981	3045̄	3109	
97	3173	3237	3300	3364	3428	3492	3556	3620	3684	3748	
98	3812	3875	3939	4003	4067	4131	4195̄	4259	4323	4387	
99	4450	4514	4578	4642	4706	4770	4834	4898	4961	5025	
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6800	832 5089	5153	5217	5281	5345̄	5408	5472	5536	5600	5664	
01	5728	5792	5855	5919	5983	6047	6111	6175̄	6239	6302	
02	6366	6430	6494	6558	6622	6686	6749	6813	6877	6941	
03	7005̄	7069	7132	7196	7260	7324	7388	7452	7515	7579	
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08	833 0195	0259	0323	0387	0451	0514	0578	0642	0706	0770	
09	0833	0897	0961	1025̄	1088	1152	1216	1280	1344	1407	
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11	2109	2173	2236	2300	2364	2428	2491	2555	2619	2683	
12	2746	2810	2874	2938	3001	3065	3129	3193	3256	3320	
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16	5296	5360	5423	5487	5551	5614	5678	5742	5806	5869	
17	5933	5997	6060	6124	6188	6251	6315	6379	6443	6506	
18	6570	6634	6697	6761	6825̄	6888	6952	7016	7080	7143	
19	7207	7271	7334	7398	7462	7525	7589	7653	7716	7780	
6820	7844	7907	7971	8035̄	8098	8162	8226	8289	8353	8417	
21	8480	8544	8608	8672	8735	8799	8862	8926	8990	9053	
22	9117	9181	9244	9308	9372	9435	9499	9563	9626	9690	
23	9754	9817	9881	9945̄	0̄008	0̄072	0̄136	0̄199	0̄263	0̄327	
24	834 0390	0454	0517	0581	0645̄	0708	0772	0836	0899	0963	
25	1027	1090	1154	1217	1281	1345̄	1408	1472	1536	1599	
26	1663	1726	1790	1854	1917	1981	2045̄	2108	2172	2235	
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29	3571	3635̄	3698	3762	3826	3889	3953	4016	4080	4143	
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31	4843	4906	4970	5034	5097	5161	5224	5288	5351	5415	
32	5479	5542	5606	5669	5733	5796	5860	5924	5987	6051	
33	6114	6178	6241	6305̄	6368	6432	6496	6559	6623	6686	
34	6750	6813	6877	6940	7004	7067	7131	7195̄	7258	7322	
35	7385	7449	7512	7576	7639	7703	7766	7830	7893	7957	
36	8021	8084	8148	8211	8275̄	8338	8402	8465	8529	8592	
37	8656	8719	8783	8846	8910	8973	9037	9100	9164	9227	
38	9291	9354	9418	9481	9545	9609	9672	9736	9799	9863	
39	9926	9990	0̄053	0̄117	0̄180	0̄244	0̄307	0̄371	0̄434	0̄498	
6840	835 0561	0625̄	0688	0751	0815̄	0878	0942	1005	1069	1132	
41	1196	1259	1323	1386	1450	1513	1577	1640	1704	1767	
42	1831	1894	1958	2021	2085̄	2148	2212	2275̄	2338	2402	
43	2465	2529	2592	2656	2719	2783	2846	2910	2973	3037	
44	3100	3163	3227	3290	3354	3417	3481	3544	3608	3671	
45	3735̄	3798	3861	3925̄	3988	4052	4115	4179	4242	4306	
46	4369	4432	4496	4559	4623	4686	4750	4813	4876	4940	
47	5003	5067	5130	5194	5257	5320	5384	5447	5511	5574	
48	5638	5701	5764	5828	5891	5955̄	6018	6081	6145̄	6208	
49	6272	6335	6398	6462	6525	6589	6652	6716	6779	6842	
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6850	835 6906	6969	7033	7096	7159	7223	7286	7349	7413	7476	
51	7540	7603	7666	7730	7793	7857	7920	7983	8047	8110	
52	8174	8237	8300	8364	8427	8490	8554	8617	8681	8744	
53	8807	8871	8934	8997	9061	9124	9188	9251	9314	9378	
54	9441	9504	9568	9631	9694	9758	9821	9885̄	9948	0̄011	
55	836 0075̄	0138	0201	0265̄	0328	0391	0455̄	0518	0581	0645̄	
56	0708	0771	0835̄	0898	0961	1025̄	1088	1151	1215̄	1278	
57	1341	1405̄	1468	1531	1595̄	1658	1721	1785̄	1848	1911	
58	1975̄	2038	2101	2165̄	2228	2291	2355̄	2418	2481	2545̄	
59	2608	2671	2735̄	2798	2861	2925̄	2988	3051	3115̄	3178	
6860	3241	3304	3368	3431	3494	3558	3621	3684	3748	3811	
61	3874	3937	4001	4064	4127	4191	4254	4317	4381	4444	63 1 6.3 2 12.6 3 18.9 4 25.2 5 31.5 6 37.8 7 44.1 8 50.4 9 56.7
62	4507	4570	4634	4697	4760	4824	4887	4950	5013	5077	
63	5140	5203	5267	5330	5393	5456	5520	5583	5646	5709	
64	5773	5836	5899	5963	6026	6089	6152	6216	6279	6342	
65	6405	6469	6532	6595	6658	6722	6785̄	6848	6911	6975̄	
66	7038	7101	7164	7228	7291	7354	7417	7481	7544	7607	
67	7670	7734	7797	7860	7923	7987	8050	8113	8176	8240	
68	8303	8366	8429	8493	8556	8619	8682	8745	8809	8872	
69	8935	8998	9062	9125̄	9188	9251	9314	9378	9441	9504	
6870	9567	9631	9694	9757	9820	9883	9947	0̄010	0̄073	0̄136	
71	837 0199	0263	0326	0389	0452	0516	0579	0642	0705	0768	
72	0832	0895̄	0958	1021	1084	1147	1211	1274	1337	1400	
73	1463	1527	1590	1653	1716	1779	1843	1906	1969	2032	
74	2095	2158	2222	2285̄	2348	2411	2474	2538	2601	2664	
75	2727	2790	2853	2917	2980	3043	3106	3169	3232	3296	
76	3359	3422	3485	3548	3611	3674	3738	3801	3864	3927	
77	3990	4053	4117	4180	4243	4306	4369	4432	4495	4559	
78	4622	4685̄	4748	4811	4874	4937	5001	5064	5127	5190	
79	5253	5316	5379	5442	5506	5569	5632	5695	5758	5821	
6880	5884	5948	6011	6074	6137	6200	6263	6326	6389	6452	
81	6516	6579	6642	6705̄	6768	6831	6894	6957	7020	7084	62 1 6.2 2 12.4 3 18.6 4 24.8 5 31.0 6 37.2 7 43.4 8 49.6 9 55.8
82	7147	7210	7273	7336	7399	7462	7525	7588	7652	7715̄	
83	7778	7841	7904	7967	8030	8093	8156	8219	8282	8346	
84	8409	8472	8535̄	8598	8661	8724	8787	8850	8913	8976	
85	9039	9103	9166	9229	9292	9355̄	9418	9481	9544	9607	
86	9670	9733	9796	9859	9922	9986	0̄049	0̄112	0̄175̄	0̄238	
87	838 0301	0364	0427	0490	0553	0616	0679	0742	0805	0868	
88	0931	0994	1057	1121	1184	1247	1310	1373	1436	1499	
89	1562	1625̄	1688	1751	1814	1877	1940	2003	2066	2129	
6890	2192	2255	2318	2381	2444	2507	2570	2633	2696	2759	
91	2822	2886	2949	3012	3075̄	3138	3201	3264	3327	3390	
92	3453	3516	3579	3642	3705̄	3768	3831	3894	3957	4020	
93	4083	4146	4209	4272	4335̄	4398	4461	4524	4587	4650	
94	4713	4776	4839	4902	4965̄	5028	5091	5154	5217	5280	
95	5343	5406	5469	5532	5595̄	5658	5721	5784	5847	5910	
96	5973	6036	6098	6161	6224	6287	6350	6413	6476	6539	
97	6602	6665	6728	6791	6854	6917	6980	7043	7106	7169	
98	7232	7295̄	7358	7421	7484	7547	7610	7673	7736	7798	
99	7861	7924	7987	8050	8113	8176	8239	8302	8365	8428	
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02	9750	9812	9875	9938	0̄001	0̄064	0̄127	0̄190	0̄253	0̄316	
03	839 0379	0442	0505̄	0567	0630	0693	0756	0819	0882	0945̄	
04	1008	1071	1134	1197	1259	1322	1385	1448	1511	1574	
05	1637	1700	1763	1826	1888	1951	2014	2077	2140	2203	
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07	2895̄	2957	3020	3083	3146	3209	3272	3335̄	3398	3460	
08	3523	3586	3649	3712	3775̄	3838	3900	3963	4026	4089	
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12	6037	6100	6163	6226	6289	6351	6414	6477	6540	6603	
13	6666	6728	6791	6854	6917	6980	7042	7105	7168	7231	
14	7294	7357	7419	7482	7545̄	7608	7671	7733	7796	7859	
15	7922	7985̄	8047	8110	8173	8236	8299	8361	8424	8487	
16	8550	8613	8675	8738	8801	8864	8927	8989	9052	9115̄	
17	9178	9241	9303	9366	9429	9492	9554	9617	9680	9743	
18	9806	9868	9931	9994	0̄057	0̄119	0̄182	0̄245̄	0̄308	0̄371	
19	840 0433	0496	0559	0622	0684	0747	0810	0873	0935	0998	
6920	1061	1124	1186	1249	1312	1375̄	1437	1500	1563	1626	
21	1688	1751	1814	1877	1939	2002	2065̄	2128	2190	2253	
22	2316	2379	2441	2504	2567	2630	2692	2755	2818	2881	
23	2943	3006	3069	3132	3194	3257	3320	3382	3445	3508	
24	3571	3633	3696	3759	3821	3884	3947	4010	4072	4135	
25	4198	4260	4323	4386	4449	4511	4574	4637	4699	4762	
26	4825̄	4888	4950	5013	5076	5138	5201	5264	5326	5389	
27	5452	5515̄	5577	5640	5703	5765	5828	5891	5953	6016	
28	6079	6141	6204	6267	6330	6392	6455̄	6518	6580	6643	
29	6706	6768	6831	6894	6956	7019	7082	7144	7207	7270	
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31	7959	8022	8084	8147	8210	8272	8335̄	8398	8460	8523	62 1 6.2 2 12.4 3 18.6 4 24.8 5 31.0 6 37.2 7 43.4 8 49.6 9 55.8
32	8586	8648	8711	8773	8836	8899	8961	9024	9087	9149	
33	9212	9275̄	9337	9400	9463	9525	9588	9650	9713	9776	
34	9838	9901	9964	0̄026	0̄089	0̄152	0̄214	0̄277	0̄339	0̄402	
35	841 0465̄	0527	0590	0653	0715	0778	0840	0903	0966	1028	
36	1091	1153	1216	1279	1341	1404	1467	1529	1592	1654	
37	1717	1780	1842	1905̄	1967	2030	2093	2155	2218	2280	
38	2343	2406	2468	2531	2593	2656	2719	2781	2844	2906	
39	2969	3031	3094	3157	3219	3282	3344	3407	3470	3532	
6940	3595̄	3657	3720	3782	3845	3908	3970	4033	4095	4158	
41	4220	4283	4346	4408	4471	4533	4596	4658	4721	4784	
42	4846	4909	4971	5034	5096	5159	5221	5284	5347	5409	
43	5472	5534	5597	5659	5722	5784	5847	5909	5972	6035̄	
44	6097	6160	6222	6285̄	6347	6410	6472	6535̄	6597	6660	
45	6723	6785	6848	6910	6973	7035	7098	7160	7223	7285	
46	7348	7410	7473	7535	7598	7660	7723	7785	7848	7910	
47	7973	8036	8098	8161	8223	8286	8348	8411	8473	8536	
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49	9223	9286	9348	9411	9473	9536	9598	9661	9723	9786	
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53	1722	1785̄	1847	1910	1972	2035̄	2097	2160	2222	2284
54	2347	2409	2472	2534	2597	2659	2722	2784	2846	2909
55	2971	3034	3096	3159	3221	3284	3346	3408	3471	3533
56	3596	3658	3721	3783	3845	3908	3970	4033	4095	4158
57	4220	4282	4345̄	4407	4470	4532	4595̄	4657	4719	4782
58	4844	4907	4969	5031	5094	5156	5219	5281	5344	5406
59	5468	5531	5593	5656	5718	5780	5843	5905	5968	6030
6960	6092	6155̄	6217	6280	6342	6404	6467	6529	6592	6654
61	6716	6779	6841	6904	6966	7028	7091	7153	7215	7278
62	7340	7403	7465̄	7527	7590	7652	7714	7777	7839	7902
63	7964	8026	8089	8151	8213	8276	8338	8401	8463	8525
64	8588	8650	8712	8775̄	8837	8899	8962	9024	9086	9149
65	9211	9274	9336	9398	9461	9523	9585	9648	9710	9772
66	9835̄	9897	9959	0̄022	0̄084	0̄146	0̄209	0̄271	0̄333	0̄396
67	843 0458	0520	0583	0645	0707	0770	0832	0894	0957	1019
68	1081	1144	1206	1268	1331	1393	1455	1518	1580	1642
69	1705̄	1767	1829	1892	1954	2016	2079	2141	2203	2265
6970	2328	2390	2452	2515̄	2577	2639	2702	2764	2826	2889
71	2951	3013	3075	3138	3200	3262	3325̄	3387	3449	3511
72	3574	3636	3698	3761	3823	3885	3948	4010	4072	4134
73	4197	4259	4321	4383	4446	4508	4570	4633	4695̄	4757
74	4819	4882	4944	5006	5069	5131	5193	5255	5318	5380
75	5442	5504	5567	5629	5691	5753	5816	5878	5940	6002
76	6065̄	6127	6189	6251	6314	6376	6438	6500	6563	6625̄
77	6687	6749	6812	6874	6936	6998	7061	7123	7185	7247
78	7310	7372	7434	7496	7559	7621	7683	7745	7808	7870
79	7932	7994	8056	8119	8181	8243	8305	8368	8430	8492
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81	9176	9239	9301	9363	9425	9487	9550	9612	9674	9736
82	9798	9861	9923	9985	0̄047	0̄109	0̄172	0̄234	0̄296	0̄358
83	844 0420	0483	0545̄	0607	0669	0731	0794	0856	0918	0980
84	1042	1104	1167	1229	1291	1353	1415	1478	1540	1602
85	1664	1726	1788	1851	1913	1975̄	2037	2099	2161	2224
86	2286	2348	2410	2472	2534	2597	2659	2721	2783	2845
87	2907	2970	3032	3094	3156	3218	3280	3343	3405̄	3467
88	3529	3591	3653	3715	3778	3840	3902	3964	4026	4088
89	4150	4213	4275̄	4337	4399	4461	4523	4585	4647	4710
6990	4772	4834	4896	4958	5020	5082	5145̄	5207	5269	5331
91	5393	5455	5517	5579	5642	5704	5766	5828	5890	5952
92	6014	6076	6138	6201	6263	6325̄	6387	6449	6511	6573
93	6635	6697	6759	6822	6884	6946	7008	7070	7132	7194
94	7256	7318	7380	7443	7505̄	7567	7629	7691	7753	7815
95	7877	7939	8001	8063	8126	8188	8250	8312	8374	8436
96	8498	8560	8622	8684	8746	8808	8870	8933	8995̄	9057
97	9119	9181	9243	9305̄	9367	9429	9491	9553	9615	9677
98	9739	9801	9863	9926	9988	0̄050	0̄112	0̄174	0̄236	0̄298
99	845 0360	0422	0484	0546	0608	0670	0732	0794	0856	0918
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P. P.

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03	2841	2903	2965	3027	3089	3151	3213	3275	3337	3399	
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06	4701	4763	4825	4887	4949	5011	5073	5135	5197	5259	
07	5321	5383	5445	5507	5569	5631	5693	5755	5817	5879	
08	5941	6003	6065	6127	6189	6251	6313	6375	6437	6499	
09	6561	6623	6685	6746	6808	6870	6932	6994	7056	7118	
7010	7180	7242	7304	7366	7428	7490	7552	7614	7676	7738	
11	7800	7862	7924	7986	8047	8109	8171	8233	8295	8357	68
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23	5227	5289	5350	5412	5474	5536	5598	5660	5721	5783	
24	5845	5907	5969	6031	6092	6154	6216	6278	6340	6401	
25	6463	6525	6587	6649	6711	6772	6834	6896	6958	7020	
26	7081	7143	7205	7267	7329	7391	7452	7514	7576	7638	
27	7700	7761	7823	7885	7947	8009	8070	8132	8194	8256	
28	8318	8379	8441	8503	8565	8626	8688	8750	8812	8874	
29	8935	8997	9059	9121	9183	9244	9306	9368	9430	9491	
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31	847 0171	0233	0295	0356	0418	0480	0542	0603	0665	0727	62
32	0789	0850	0912	0974	1036	1097	1159	1221	1283	1344	1 6.2
33	1406	1468	1530	1591	1653	1715	1777	1838	1900	1962	2 12.4
34	2024	2085	2147	2209	2271	2332	2394	2456	2518	2579	3 18.6
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38	4493	4554	4616	4678	4739	4801	4863	4925	4986	5048	7 43.4
39	5110	5171	5233	5295	5356	5418	5480	5542	5603	5665	8 49.6
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46	9426	9488	9550	9611	9673	9735	9796	9858	9919	9981	
47	848 0043	0104	0166	0228	0289	0351	0412	0474	0536	0597	
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7050 — 7100

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52	3123	3185̄	3246	3308	3369	3431	3493	3554	3616	3677	
53	3739	3800	3862	3924	3985	4047	4108	4170	4231	4293	
54	4355̄	4416	4478	4539	4601	4662	4724	4786	4847	4909	
55	4970	5032	5093	5155̄	5216	5278	5340	5401	5463	5524	
56	5586	5647	5709	5770	5832	5893	5955	6017	6078	6140	
57	6201	6263	6324	6386	6447	6509	6570	6632	6693	6755	
58	6817	6878	6940	7001	7063	7124	7186	7247	7309	7370	
59	7432	7493	7555̄	7616	7678	7739	7801	7862	7924	7985	
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61	8662	8724	8785	8847	8908	8970	9031	9093	9154	9216	
62	9277	9339	9400	9462	9523	9585̄	9646	9708	9769	9831	
63	9892	9954	0̄015	0̄077	0̄138	0̄199	0̄261	0̄322	0̄384	0̄445	
64	849 0507	0568	0630	0691	0753	0814	0876	0937	0999	1060	
65	1122	1183	1245̄	1306	1368	1429	1490	1552	1613	1675̄	
66	1736	1798	1859	1921	1982	2044	2105	2167	2228	2289	
67	2351	2412	2474	2535	2597	2658	2720	2781	2843	2904	
68	2965	3027	3088	3150	3211	3273	3334	3396	3457	3518	
69	3580	3641	3703	3764	3826	3887	3948	4010	4071	4133	
7070	4194	4256	4317	4378	4440	4501	4563	4624	4686	4747	
71	4808	4870	4931	4993	5054	5115	5177	5238	5300	5361	
72	5423	5484	5545	5607	5668	5730	5791	5852	5914	5975	
73	6037	6098	6159	6221	6282	6344	6405̄	6466	6528	6589	
74	6651	6712	6773	6835̄	6896	6958	7019	7080	7142	7203	
75	7264	7326	7387	7449	7510	7571	7633	7694	7755	7817	
76	7878	7940	8001	8062	8124	8185	8246	8308	8369	8431	
77	8492	8553	8615̄	8676	8737	8799	8860	8922	8983	9044	
78	9106	9167	9228	9290	9351	9412	9474	9535	9596	9658	
79	9719	9780	9842	9903	9965̄	0̄026	0̄087	0̄149	0̄210	0̄271	
7080	850 0333	0394	0455	0517	0578	0639	0701	0762	0823	0885̄	
81	0946	1007	1069	1130	1191	1253	1314	1375	1437	1498	
82	1559	1621	1682	1743	1805̄	1866	1927	1988	2050	2111	
83	2172	2234	2295	2356	2418	2479	2540	2602	2663	2724	
84	2786	2847	2908	2969	3031	3092	3153	3215̄	3276	3337	
85	3399	3460	3521	3582	3644	3705	3766	3828	3889	3950	
86	4011	4073	4134	4195	4257	4318	4379	4440	4502	4563	
87	4624	4686	4747	4808	4869	4931	4992	5053	5115̄	5176	
88	5237	5298	5360	5421	5482	5543	5605̄	5666	5727	5788	
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7090	6462	6524	6585̄	6646	6707	6769	6830	6891	6952	7014	
91	7075̄	7136	7197	7259	7320	7381	7442	7504	7565̄	7626	
92	7687	7749	7810	7871	7932	7993	8055̄	8116	8177	8238	
93	8300	8361	8422	8483	8545̄	8606	8667	8728	8789	8851	
94	8912	8973	9034	9095	9157	9218	9279	9340	9402	9463	
95	9524	9585	9646	9708	9769	9830	9891	9952	0̄014	0̄075̄	
96	851 0136	0197	0258	0320	0381	0442	0503	0564	0626	0687	
97	0748	0809	0870	0932	0993	1054	1115	1176	1238	1299	
98	1360	1421	1482	1544	1605̄	1666	1727	1788	1849	1911	
99	1972	2033	2094	2155	2216	2278	2339	2400	2461	2522	
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22	6020	6081	6142	6203	6264	6325	6386	6447	6508	6568
23	6629	6690	6751	6812	6873	6934	6995	7056	7117	7178
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25	7849	7910	7971	8032	8092	8153	8214	8275	8336	8397
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38	5765	5826	5887	5948	6009	6070	6130	6191	6252	6313
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41	7590	7651	7712	7773	7834	7894	7955	8016	8077	8138
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43	8807	8867	8928	8989	9050	9110	9171	9232	9293	9354
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47	1238	1299	1359	1420	1481	1542	1602	1663	1724	1785
48	1845	1906	1967	2028	2088	2149	2210	2271	2331	2392
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P. P.

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53	4882	4943	5004	5064	5125	5186	5247	5307	5368	5429	
54	5489	5550	5611	5671	5732	5793	5854	5914	5975̅	6036	
55	6096	6157	6218	6278	6339	6400	6461	6521	6582	6643	
56	6703	6764	6825̅	6885	6946	7007	7067	7128	7189	7249	
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58	7917	7978	8038	8099	8160	8220	8281	8342	8402	8463	
59	8524	8584	8645̅	8706	8766	8827	8888	8948	9009	9070	
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65	2162	2223	2283	2344	2404	2465	2526	2586	2647	2707	
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67	3374	3435̅	3495	3556	3616	3677	3738	3798	3859	3919	
68	3980	4041	4101	4162	4222	4283	4343	4404	4465̅	4525	
69	4586	4646	4707	4768	4828	4889	4949	5010	5070	5131	
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71	5797	5858	5918	5979	6039	6100	6161	6221	6282	6342	
72	6403	6463	6524	6584	6645	6706	6766	6827	6887	6948	
73	7008	7069	7129	7190	7250	7311	7372	7432	7493	7553	
74	7614	7674	7735̅	7795	7856	7916	7977	8037	8098	8159	
75	8219	8280	8340	8401	8461	8522	8582	8643	8703	8764	
76	8824	8885̅	8945	9006	9066	9127	9187	9248	9308	9369	
77	9429	9490	9550	9611	9672	9732	9793	9853	9914	9974	
78	856 0035̅	0095	0156	0216	0277	0337	0398	0458	0519	0579	
79	0640	0700	0761	0821	0882	0942	1002	1063	1123	1184	
7180	1244	1305̅	1365	1426	1486	1547	1607	1668	1728	1789	
81	1849	1910	1970	2031	2091	2152	2212	2273	2333	2394	60 1 6.0 2 12.0 3 18.0 4 24.0 5 30.0 6 36.0 7 42.0 8 48.0 9 54.0
82	2454	2514	2575̅	2635	2696	2756	2817	2877	2938	2998	
83	3059	3119	3180	3240	3301	3361	3421	3482	3542	3603	
84	3663	3724	3784	3845̅	3905	3965	4026	4086	4147	4207	
85	4268	4328	4389	4449	4509	4570	4630	4691	4751	4812	
86	4872	4933	4993	5053	5114	5174	5235̅	5295	5356	5416	
87	5476	5537	5597	5658	5718	5779	5839	5899	5960	6020	
88	6081	6141	6202	6262	6322	6383	6443	6504	6564	6624	
89	6685̅	6745	6806	6866	6926	6987	7047	7108	7168	7229	
7190	7289	7349	7410	7470	7531	7591	7651	7712	7772	7832	
91	7893	7953	8014	8074	8134	8195̅	8255	8316	8376	8436	
92	8497	8557	8618	8678	8738	8799	8859	8919	8980	9040	
93	9101	9161	9221	9282	9342	9402	9463	9523	9584	9644	
94	9704	9765̅	9825	9885	9946	0̅006	0̅067	0̅127	0̅187	0̅248	
95	857 0308	0368	0429	0489	0549	0610	0670	0730	0791	0851	
96	0912	0972	1032	1093	1153	1213	1274	1334	1394	1455̅	
97	1515	1575	1636	1696	1756	1817	1877	1937	1998	2058	
98	2118	2179	2239	2299	2360	2420	2480	2541	2601	2661	
99	2722	2782	2842	2903	2963	3023	3084	3144	3204	3265̅	
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02	4531	4591	4652	4712	4772	4833	4893	4953	5014	5074
03	5134	5194	5255	5315	5375	5436	5496	5556	5616	5677
04	5737	5797	5858	5918	5978	6038	6099	6159	6219	6280
05	6340	6400	6460	6521	6581	6641	6701	6762	6822	6882
06	6943	7003	7063	7123	7184	7244	7304	7364	7425	7485
07	7545	7605	7666	7726	7786	7847	7907	7967	8027	8088
08	8148	8208	8268	8329	8389	8449	8509	8570	8630	8690
09	8750	8810	8871	8931	8991	9051	9112	9172	9232	9292
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12	858 0557	0617	0678	0738	0798	0858	0918	0979	1039	1099
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15	2363	2424	2484	2544	2604	2664	2724	2785	2845	2905
16	2965	3025	3086	3146	3206	3266	3326	3387	3447	3507
17	3567	3627	3687	3748	3808	3868	3928	3988	4048	4109
18	4169	4229	4289	4349	4409	4470	4530	4590	4650	4710
19	4770	4831	4891	4951	5011	5071	5131	5192	5252	5312
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21	5973	6034	6094	6154	6214	6274	6334	6394	6455	6515
22	6575	6635	6695	6755	6815	6876	6936	6996	7056	7116
23	7176	7236	7296	7357	7417	7477	7537	7597	7657	7717
24	7777	7837	7898	7958	8018	8078	8138	8198	8258	8318
25	8379	8439	8499	8559	8619	8679	8739	8799	8859	8919
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27	9581	9641	9701	9761	9821	9881	9941	0001	0061	0121
28	859 0181	0242	0302	0362	0422	0482	0542	0602	0662	0722
29	0782	0842	0902	0962	1023	1083	1143	1203	1263	1323
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32	2584	2644	2704	2764	2824	2884	2944	3005	3065	3125
33	3185	3245	3305	3365	3425	3485	3545	3605	3665	3725
34	3785	3845	3905	3965	4025	4085	4145	4205	4265	4325
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36	4986	5046	5106	5166	5226	5286	5346	5406	5466	5526
37	5586	5646	5706	5766	5826	5886	5946	6006	6066	6126
38	6186	6246	6306	6366	6426	6486	6546	6606	6666	6726
39	6786	6846	6906	6966	7026	7086	7146	7206	7266	7326
7240	7386	7446	7506	7566	7626	7686	7746	7806	7866	7925
41	7985	8045	8105	8165	8225	8285	8345	8405	8465	8525
42	8585	8645	8705	8765	8825	8885	8945	9005	9065	9125
43	9185	9245	9305	9365	9425	9485	9545	9605	9665	9724
44	9784	9844	9904	9964	0024	0084	0144	0204	0264	0324
45	860 0384	0444	0504	0564	0624	0684	0744	0803	0863	0923
46	0983	1043	1103	1163	1223	1283	1343	1403	1463	1523
47	1583	1643	1702	1762	1822	1882	1942	2002	2062	2122
48	2182	2242	2302	2362	2422	2481	2541	2601	2661	2721
49	2781	2841	2901	2961	3021	3081	3140	3200	3260	3320
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53	5177	5237	5297	5356	5416	5476	5536	5596	5656	5716
54	5776	5835	5895	5955	6015	6075	6135	6195	6254	6314
55	6374	6434	6494	6554	6614	6673	6733	6793	6853	6913
56	6973	7033	7092	7152	7212	7272	7332	7392	7452	7511
57	7571	7631	7691	7751	7811	7870	7930	7990	8050	8110
58	8170	8229	8289	8349	8409	8469	8529	8588	8648	8708
59	8768	8828	8888	8947	9007	9067	9127	9187	9247	9306
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61	9964	0024	0084	0144	0204	0263	0323	0383	0443	0503
62	861 0562	0622	0682	0742	0802	0861	0921	0981	1041	1101
63	1160	1220	1280	1340	1400	1459	1519	1579	1639	1699
64	1758	1818	1878	1938	1997	2057	2117	2177	2237	2296
65	2356	2416	2476	2536	2595	2655	2715	2775	2834	2894
66	2954	3014	3073	3133	3193	3253	3313	3372	3432	3492
67	3552	3611	3671	3731	3791	3850	3910	3970	4030	4089
68	4149	4209	4269	4328	4388	4448	4508	4567	4627	4687
69	4747	4806	4866	4926	4986	5045	5105	5165	5225	5284
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71	5941	6001	6061	6121	6180	6240	6300	6360	6419	6479
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73	7136	7196	7255	7315	7375	7434	7494	7554	7614	7673
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75	8330	8390	8449	8509	8569	8628	8688	8748	8808	8867
76	8927	8987	9046	9106	9166	9225	9285	9345	9404	9464
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78	862 0121	0180	0240	0300	0359	0419	0479	0538	0598	0658
79	0717	0777	0837	0896	0956	1016	1075	1135	1194	1254
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81	1910	1970	2030	2089	2149	2209	2268	2328	2387	2447
82	2507	2566	2626	2686	2745	2805	2865	2924	2984	3043
83	3103	3163	3222	3282	3342	3401	3461	3520	3580	3640
84	3699	3759	3819	3878	3938	3997	4057	4117	4176	4236
85	4296	4355	4415	4474	4534	4594	4653	4713	4772	4832
86	4892	4951	5011	5070	5130	5190	5249	5309	5368	5428
87	5488	5547	5607	5666	5726	5786	5845	5905	5964	6024
88	6084	6143	6203	6262	6322	6382	6441	6501	6560	6620
89	6680	6739	6799	6858	6918	6977	7037	7097	7156	7216
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91	7871	7931	7990	8050	8109	8169	8228	8288	8347	8407
92	8467	8526	8586	8645	8705	8764	8824	8883	8943	9003
93	9062	9122	9181	9241	9300	9360	9419	9479	9539	9598
94	9658	9717	9777	9836	9896	9955	0015	0074	0134	0193
95	863 0253	0312	0372	0432	0491	0551	0610	0670	0729	0789
96	0848	0908	0967	1027	1086	1146	1205	1265	1324	1384
97	1443	1503	1562	1622	1682	1741	1801	1860	1920	1979
98	2039	2098	2158	2217	2277	2336	2396	2455	2515	2574
99	2634	2693	2753	2812	2872	2931	2991	3050	3110	3169
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P. P.

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02	4418	4478	4537	4597	4656	4716	4775	4835	4894	4954	
03	5013	5072	5132	5191	5251	5310	5370	5429	5489	5548	
04	5608	5667	5727	5786	5845	5905	5964	6024	6083	6143	
05	6202	6262	6321	6381	6440	6499	6559	6618	6678	6737	
06	6797	6856	6916	6975	7034	7094	7153	7213	7272	7332	
07	7391	7451	7510	7569	7629	7688	7748	7807	7867	7926	
08	7985	8045	8104	8164	8223	8283	8342	8401	8461	8520	
09	8580	8639	8698	8758	8817	8877	8936	8996	9055	9114	
7310	9174	9233	9293	9352	9411	9471	9530	9590	9649	9708	
11	9768	9827	9887	9946	0̄005	0̄065	0̄124	0̄184	0̄243	0̄302	60 1 6.0 2 12.0 3 18.0 4 24.0 5 30.0 6 36.0 7 42.0 8 48.0 9 54.0
12	864 0362	0421	0481	0540	0599	0659	0718	0778	0837	0896	
13	0956	1015	1075	1134	1193	1253	1312	1371	1431	1490	
14	1550	1609	1668	1728	1787	1846	1906	1965	2025	2084	
15	2143	2203	2262	2321	2381	2440	2500	2559	2618	2678	
16	2737	2796	2856	2915	2974	3034	3093	3152	3212	3271	
17	3331	3390	3449	3509	3568	3627	3687	3746	3805	3865	
18	3924	3983	4043	4102	4161	4221	4280	4339	4399	4458	
19	4517	4577	4636	4695	4755	4814	4873	4933	4992	5051	
7320	5111	5170	5229	5289	5348	5407	5467	5526	5585	5645	
21	5704	5763	5823	5882	5941	6001	6060	6119	6179	6238	
22	6297	6357	6416	6475	6534	6594	6653	6712	6772	6831	
23	6890	6950	7000	7068	7128	7187	7246	7305	7365	7424	
24	7483	7543	7602	7661	7721	7780	7839	7898	7958	8017	
25	8076	8136	8195	8254	8313	8373	8432	8491	8551	8610	
26	8669	8728	8788	8847	8906	8966	9025	9084	9143	9203	
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31	1632	1691	1751	1810	1869	1928	1988	2047	2106	2165	59 1 5.9 2 11.8 3 17.7 4 23.6 5 29.5 6 35.4 7 41.3 8 47.2 9 53.1
32	2225	2284	2343	2402	2461	2521	2580	2639	2698	2758	
33	2817	2876	2935	2995	3054	3113	3172	3231	3291	3350	
34	3409	3468	3527	3587	3646	3705	3764	3824	3883	3942	
35	4001	4060	4120	4179	4238	4297	4356	4416	4475	4534	
36	4593	4652	4712	4771	4830	4889	4948	5008	5067	5126	
37	5185	5244	5304	5363	5422	5481	5540	5600	5659	5718	
38	5777	5836	5895	5955	6014	6073	6132	6191	6251	6310	
39	6369	6428	6487	6546	6606	6665	6724	6783	6842	6901	
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43	8735	8794	8854	8913	8972	9031	9090	9149	9208	9268	
44	9327	9386	9445	9504	9563	9622	9681	9741	9800	9859	
45	9918	9977	0̄036	0̄095	0̄155	0̄214	0̄273	0̄332	0̄391	0̄450	
46	866 0509	0568	0627	0687	0746	0805	0864	0923	0982	1041	
47	1100	1160	1219	1278	1337	1396	1455	1514	1573	1632	
48	1691	1751	1810	1869	1928	1987	2046	2105	2164	2223	
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7350 — 7400

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52	4055̄	4114	4173	4232	4291	4350	4409	4468	4528	4587	
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54	5236	5295	5354	5413	5472	5532	5591	5650	5709	5768	
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62	9958	0̄017	0̄076	0̄135	0̄194	0̄253	0̄312	0̄371	0̄430	0̄489	
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65	1728	1786	1845	1904	1963	2022	2081	2140	2199	2258	
66	2317	2376	2435	2494	2553	2612	2671	2730	2789	2848	
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71	5264	5323	5382	5441	5500	5559	5618	5677	5735	5794	
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81	1152	1211	1270	1329	1387	1446	1505	1564	1623	1682	58 1 5.8 2 11.6 3 17.4 4 23.2 5 29.0 6 34.8 7 40.6 8 46.4 9 52.2
82	1740	1799	1858	1917	1976	2035̄	2093	2152	2211	2270	
83	2329	2388	2446	2505	2564	2623	2682	2740	2799	2858	
84	2917	2976	3035̄	3093	3152	3211	3270	3329	3387	3446	
85	3505̄	3564	3623	3681	3740	3799	3858	3917	3975	4034	
86	4093	4152	4211	4269	4328	4387	4446	4505̄	4563	4622	
87	4681	4740	4799	4857	4916	4975̄	5034	5093	5151	5210	
88	5269	5328	5386	5445	5504	5563	5622	5680	5739	5798	
89	5857	5915	5974	6033	6092	6151	6209	6268	6327	6386	
7390	6444	6503	6562	6621	6679	6738	6797	6856	6915̄	6973	
91	7032	7091	7150	7208	7267	7326	7385̄	7443	7502	7561	
92	7620	7678	7737	7796	7855̄	7913	7972	8031	8090	8148	
93	8207	8266	8325̄	8383	8442	8501	8560	8618	8677	8736	
94	8794	8853	8912	8971	9029	9088	9147	9206	9264	9323	
95	9382	9441	9499	9558	9617	9675	9734	9793	9852	9910	
96	9969	0̄028	0̄086	0̄145	0̄204	0̄263	0̄321	0̄380	0̄439	0̄497	
97	869 0556	0615̄	0674	0732	0791	0850	0908	0967	1026	1085̄	
98	1143	1202	1261	1319	1378	1437	1495	1554	1613	1672	
99	1730	1789	1848	1906	1965	2024	2082	2141	2200	2259	
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7400	869 2317	2376	2435̄	2493	2552	2611	2669	2728	2787	2845	
01	2904	2963	3021	3080	3139	3197	3256	3315̄	3373	3432	
02	3491	3549	3608	3667	3725	3784	3843	3901	3960	4019	
03	4077	4136	4195̄	4253	4312	4371	4429	4488	4547	4605	
04	4664	4723	4781	4840	4899	4957	5016	5075̄	5133	5192	
05	5251	5309	5368	5427	5485	5544	5603	5661	5720	5778	
06	5837	5896	5954	6013	6072	6130	6189	6248	6306	6365̄	
07	6423	6482	6541	6599	6658	6717	6775	6834	6892	6951	
08	7010	7068	7127	7186	7244	7303	7361	7420	7479	7537	
09	7596	7655̄	7713	7772	7830	7889	7948	8006	8065̄	8123	
7410	8182	8241	8299	8358	8417	8475	8534	8592	8651	8710	
11	8768	8827	8885	8944	9003	9061	9120	9178	9237	9296	59 1 5.9 2 11.8 3 17.7 4 23.6 5 29.5 6 35.4 7 41.3 8 47.2 9 53.1
12	9354	9413	9471	9530	9588	9647	9706	9764	9823	9881	
13	9940	9999	0̄057	0̄116	0̄174	0̄233	0̄292	0̄350	0̄409	0̄467	
14	870 0526	0584	0643	0702	0760	0819	0877	0936	0994	1053	
15	1112	1170	1229	1287	1346	1404	1463	1522	1580	1639	
16	1697	1756	1814	1873	1931	1990	2049	2107	2166	2224	
17	2283	2341	2400	2458	2517	2576	2634	2693	2751	2810	
18	2868	2927	2985	3044	3102	3161	3220	3278	3337	3395	
19	3454	3512	3571	3629	3688	3746	3805̄	3863	3922	3981	
7420	4039	4098	4156	4215̄	4273	4332	4390	4449	4507	4566	
21	4624	4683	4741	4800	4858	4917	4975	5034	5092	5151	
22	5210	5268	5327	5385	5444	5502	5561	5619	5678	5736	
23	5795̄	5853	5912	5970	6029	6087	6146	6204	6263	6321	
24	6380	6438	6497	6555	6614	6672	6731	6789	6848	6906	
25	6965̄	7023	7082	7140	7199	7257	7316	7374	7432	7491	
26	7549	7608	7666	7725̄	7783	7842	7900	7959	8017	8076	
27	8134	8193	8251	8310	8368	8427	8485	8544	8602	8660	
28	8719	8777	8836	8894	8953	9011	9070	9128	9187	9245	
29	9304	9362	9421	9479	9537	9596	9654	9713	9771	9830	
7430	9888	9947	0̄005	0̄063	0̄122	0̄180	0̄239	0̄297	0̄356	0̄414	
31	871 0473	0531	0589	0648	0706	0765̄	0823	0882	0940	0999	58 1 5.8 2 11.6 3 17.4 4 23.2 5 29.0 6 34.8 7 40.6 8 46.4 9 52.2
32	1057	1115	1174	1232	1291	1349	1408	1466	1524	1583	
33	1641	1700	1758	1817	1875	1933	1992	2050	2109	2167	
34	2226	2284	2342	2401	2459	2518	2576	2634	2693	2751	
35	2810	2868	2927	2985̄	3043	3102	3160	3219	3277	3335	
36	3394	3452	3511	3569	3627	3686	3744	3803	3861	3919	
37	3978	4036	4095̄	4153	4211	4270	4328	4387	4445̄	4503	
38	4562	4620	4679	4737	4795	4854	4912	4970	5029	5087	
39	5146	5204	5262	5321	5379	5437	5496	5554	5613	5671	
7440	5729	5788	5846	5904	5963	6021	6080	6138	6196	6255̄	
41	6313	6371	6430	6488	6546	6605̄	6663	6722	6780	6838	
42	6897	6955	7013	7072	7130	7188	7247	7305	7363	7422	
43	7480	7539	7597	7655	7714	7772	7830	7889	7947	8005	
44	8064	8122	8180	8239	8297	8355	8414	8472	8530	8589	
45	8647	8705	8764	8822	8880	8939	8997	9055	9114	9172	
46	9230	9289	9347	9405	9464	9522	9580	9639	9697	9755	
47	9814	9872	9930	9988	0̄047	0̄105	0̄163	0̄222	0̄280	0̄338	
48	872 0397	0455̄	0513	0572	0630	0688	0747	0805̄	0863	0921	
49	0980	1038	1096	1155̄	1213	1271	1330	1388	1446	1504	
7450	1563	1621	1679	1738	1796	1854	1912	1971	2029	2087	
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7450	872 1563	1621	1679	1738	1796	1854	1912	1971	2029	2087	
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52	2728	2787	2845	2903	2962	3020	3078	3136	3195̄	3253	
53	3311	3369	3428	3486	3544	3603	3661	3719	3777	3836	
54	3894	3952	4010	4069	4127	4185	4243	4302	4360	4418	
55	4476	4535̄	4593	4651	4709	4768	4826	4884	4942	5001	
56	5059	5117	5175	5234	5292	5350	5408	5467	5525̄	5583	
57	5641	5700	5758	5816	5874	5933	5991	6049	6107	6166	
58	6224	6282	6340	6398	6457	6515̄	6573	6631	6690	6748	
59	6806	6864	6923	6981	7039	7097	7155	7214	7272	7330	
7460	7388	7446	7505̄	7563	7621	7679	7738	7796	7854	7912	
61	7970	8029	8087	8145	8203	8261	8320	8378	8436	8494	58
62	8552	8611	8669	8727	8785	8843	8902	8960	9018	9076	1 5.8
63	9134	9193	9251	9309	9367	9425	9484	9542	9600	9658	2 11.6
64	9716	9774	9833	9891	9949	0̄007	0̄065	0̄124	0̄182	0̄240	3 17.4
65	873 0298	0356	0414	0473	0531	0589	0647	0705	0764	0822	4 23.2
66	0880	0938	0996	1054	1113	1171	1229	1287	1345	1403	5 29.0 6 34.8
67	1462	1520	1578	1636	1694	1752	1810	1869	1927	1985̄	7 40.6
68	2043	2101	2159	2218	2276	2334	2392	2450	2508	2566	8 46.4
69	2625̄	2683	2741	2799	2857	2915	2973	3032	3090	3148	9 52.2
7470	3206	3264	3322	3380	3439	3497	3555̄	3613	3671	3729	
71	3787	3845	3904	3962	4020	4078	4136	4194	4252	4311	
72	4369	4427	4485̄	4543	4601	4659	4717	4775	4834	4892	
73	4950	5008	5066	5124	5182	5240	5298	5357	5415̄	5473	
74	5531	5589	5647	5705	5763	5821	5880	5938	5996	6054	
75	6112	6170	6228	6286	6344	6402	6461	6519	6577	6635̄	
76	6693	6751	6809	6867	6925	6983	7041	7100	7158	7216	
77	7274	7332	7390	7448	7506	7564	7622	7680	7738	7797	
78	7855̄	7913	7971	8029	8087	8145̄	8203	8261	8319	8377	
79	8435	8493	8551	8610	8668	8726	8784	8842	8900	8958	
7480	9016	9074	9132	9190	9248	9306	9364	9422	9480	9538	
81	9597	9655̄	9713	9771	9829	9887	9945̄	0̄003	0̄061	0̄119	57
82	874 0177	0235	0293	0351	0409	0467	0525	0583	0641	0699	1 5.7
83	0757	0815	0874	0932	0990	1048	1106	1164	1222	1280	2 11.4 3 17.1
84	1338	1396	1454	1512	1570	1628	1686	1744	1802	1860	4 22.8
85	1918	1976	2034	2092	2150	2208	2266	2324	2382	2440	5 28.5
86	2498	2556	2614	2672	2730	2788	2846	2904	2962	3020	6 34.2
87	3078	3136	3194	3252	3310	3368	3426	3484	3542	3600	7 39.9
88	3658	3716	3774	3832	3890	3948	4006	4064	4122	4180	8 45.6
89	4238	4296	4354	4412	4470	4528	4586	4644	4702	4760	9 51.3
7490	4818	4876	4934	4992	5050	5108	5166	5224	5282	5340	
91	5398	5456	5514	5572	5630	5688	5746	5804	5862	5920	
92	5978	6036	6094	6152	6210	6268	6325	6383	6441	6499	
93	6557	6615	6673	6731	6789	6847	6905	6963	7021	7079	
94	7137	7195	7253	7311	7369	7427	7485̄	7543	7600	7658	
95	7716	7774	7832	7890	7948	8006	8064	8122	8180	8238	
96	8296	8354	8412	8470	8528	8585	8643	8701	8759	8817	
97	8875	8933	8991	9049	9107	9165̄	9223	9281	9339	9396	
98	9454	9512	9570	9628	9686	9744	9802	9860	9918	9976	
99	875 0034	0091	0149	0207	0265	0323	0381	0439	0497	0555̄	
7500	0613	0671	0728	0786	0844	0902	0960	1018	1076	1134	
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7500	875 0613	0671	0728	0786	0844	0902	0960	1018	1076	1134	
01	1192	1250	1307	1365	1423	1481	1539	1597	1655̄	1713	
02	1771	1828	1886	1944	2002	2060	2118	2176	2234	2292	
03	2349	2407	2465	2523	2581	2639	2697	2755̄	2813	2870	
04	2928	2986	3044	3102	3160	3218	3275	3333	3391	3449	
05	3507	3565̄	3623	3681	3738	3796	3854	3912	3970	4028	
06	4086	4143	4201	4259	4317	4375̄	4433	4491	4548	4606	
07	4664	4722	4780	4838	4896	4953	5011	5069	5127	5185̄	
08	5243	5300	5358	5416	5474	5532	5590	5648	5705	5763	
09	5821	5879	5937	5995̄	6052	6110	6168	6226	6284	6342	
7510	6399	6457	6515	6573	6631	6689	6746	6804	6862	6920	
11	6978	7035	7093	7151	7209	7267	7325̄	7382	7440	7498	58 1 5.8 2 11.6 3 17.4 4 23.2 5 29.0 6 34.8 7 40.6 8 46.4 9 52.2
12	7556	7614	7671	7729	7787	7845̄	7903	7960	8018	8076	
13	8134	8192	8249	8307	8365	8423	8481	8539	8596	8654	
14	8712	8770	8828	8885	8943	9001	9059	9116	9174	9232	
15	9290	9348	9405	9463	9521	9579	9637	9694	9752	9810	
16	9868	9925	9983	0̄041	0̄099	0̄157	0̄214	0̄272	0̄330	0̄388	
17	876 0446	0503	0561	0619	0677	0734	0792	0850	0908	0965	
18	1023	1081	1139	1197	1254	1312	1370	1428	1485	1543	
19	1601	1659	1716	1774	1832	1890	1947	2005	2063	2121	
7520	2178	2236	2294	2352	2409	2467	2525̄	2583	2640	2698	
21	2756	2814	2871	2929	2987	3045̄	3102	3160	3218	3276	
22	3333	3391	3449	3506	3564	3622	3680	3737	3795	3853	
23	3911	3968	4026	4084	4142	4199	4257	4315̄	4372	4430	
24	4488	4546	4603	4661	4719	4776	4834	4892	4950	5007	
25	5065	5123	5180	5238	5296	5354	5411	5469	5527	5584	
26	5642	5700	5758	5815	5873	5931	5988	6046	6104	6161	
27	6219	6277	6335̄	6392	6450	6508	6565	6623	6681	6738	
28	6796	6854	6911	6969	7027	7085̄	7142	7200	7258	7315	
29	7373	7431	7488	7546	7604	7661	7719	7777	7834	7892	
7530	7950	8007	8065	8123	8180	8238	8296	8353	8411	8469	
31	8526	8584	8642	8699	8757	8815̄	8872	8930	8988	9045	57 1 5.7 2 11.4 3 17.1 4 22.8 5 28.5 6 34.2 7 39.9 8 45.6 9 51.3
32	9103	9161	9218	9276	9334	9391	9449	9507	9564	9622	
33	9680	9737	9795̄	9853	9910	9968	0̄026	0̄083	0̄141	0̄199	
34	877 0256	0314	0371	0429	0487	0544	0602	0660	0717	0775̄	
35	0833	0890	0948	1005	1063	1121	1178	1236	1294	1351	
36	1409	1467	1524	1582	1639	1697	1755̄	1812	1870	1928	
37	1985	2043	2100	2158	2216	2273	2331	2388	2446	2504	
38	2561	2619	2677	2734	2792	2849	2907	2965̄	3022	3080	
39	3137	3195	3253	3310	3368	3425	3483	3541	3598	3656	
7540	3713	3771	3829	3886	3944	4001	4059	4117	4174	4232	
41	4289	4347	4405̄	4462	4520	4577	4635̄	4693	4750	4808	
42	4865	4923	4980	5038	5096	5153	5211	5268	5326	5384	
43	5441	5499	5556	5614	5671	5729	5787	5844	5902	5959	
44	6017	6074	6132	6189	6247	6305̄	6362	6420	6477	6535̄	
45	6592	6650	6708	6765	6823	6880	6938	6995	7053	7110	
46	7168	7226	7283	7341	7398	7456	7513	7571	7628	7686	
47	7743	7801	7859	7916	7974	8031	8089	8146	8204	8261	
48	8319	8376	8434	8492	8549	8607	8664	8722	8779	8837	
49	8894	8952	9009	9067	9124	9182	9239	9297	9354	9412	
7550	9470	9527	9585̄	9642	9700	9757	9815̄	9872	9930	9987	
N.	0	1	2	3	4	5	6	7	8	9	P. P.

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7550	877 9470	9527	9585̄	9642	9700	9757	9815̄	9872	9930	9987
51	878 0045̄	0102	0160	0217	0275̄	0332	0390	0447	0505̄	0562
52	0620	0677	0735̄	0792	0850	0907	0965̄	1022	1080	1137
53	1195̄	1252	1310	1367	1425̄	1482	1540	1597	1655̄	1712
54	1770	1827	1885̄	1942	2000	2057	2115̄	2172	2230	2287
55	2345̄	2402	2460	2517	2575̄	2632	2690	2747	2805̄	2862
56	2919	2977	3034	3092	3149	3207	3264	3322	3379	3437
57	3494	3552	3609	3667	3724	3782	3839	3896	3954	4011
58	4069	4126	4184	4241	4299	4356	4414	4471	4529	4586
59	4643	4701	4758	4816	4873	4931	4988	5046	5103	5161
7560	5218	5275	5333	5390	5448	5505	5563	5620	5678	5735̄
61	5792	5850	5907	5965̄	6022	6080	6137	6194	6252	6309
62	6367	6424	6482	6539	6596	6654	6711	6769	6826	6884
63	6941	6998	7056	7113	7171	7228	7286	7343	7400	7458
64	7515	7573	7630	7687	7745̄	7802	7860	7917	7975̄	8032
65	8089	8147	8204	8262	8319	8376	8434	8491	8549	8606
66	8663	8721	8778	8836	8893	8950	9008	9065	9123	9180
67	9237	9295̄	9352	9410	9467	9524	9582	9639	9696	9754
68	9811	9869	9926	9983	0̄041	0̄098	0̄156	0̄213	0̄270	0̄328
69	879 0385̄	0442	0500	0557	0615̄	0672	0729	0787	0844	0901
7570	0959	1016	1074	1131	1188	1246	1303	1360	1418	1475
71	1532	1590	1647	1705̄	1762	1819	1877	1934	1991	2049
72	2106	2163	2221	2278	2335	2393	2450	2508	2565̄	2622
73	2680	2737	2794	2852	2909	2966	3024	3081	3138	3196
74	3253	3310	3368	3425	3482	3540	3597	3654	3712	3769
75	3826	3884	3941	3998	4056	4113	4170	4228	4285	4342
76	4400	4457	4514	4572	4629	4686	4744	4801	4858	4916
77	4973	5030	5088	5145̄	5202	5259	5317	5374	5431	5489
78	5546	5603	5661	5718	5775	5833	5890	5947	6004	6062
79	6119	6176	6234	6291	6348	6406	6463	6520	6577	6635̄
7580	6692	6749	6807	6864	6921	6979	7036	7093	7150	7208
81	7265̄	7322	7380	7437	7494	7551	7609	7666	7723	7781
82	7838	7895	7952	8010	8067	8124	8181	8239	8296	8353
83	8411	8468	8525	8582	8640	8697	8754	8811	8869	8926
84	8983	9041	9098	9155	9212	9270	9327	9384	9441	9499
85	9556	9613	9670	9728	9785̄	9842	9899	9957	0̄014	0̄071
86	880 0128	0186	0243	0300	0357	0415̄	0472	0529	0586	0644
87	0701	0758	0815	0873	0930	0987	1044	1102	1159	1216
88	1273	1330	1388	1445̄	1502	1559	1617	1674	1731	1788
89	1846	1903	1960	2017	2074	2132	2189	2246	2303	2361
7590	2418	2475̄	2532	2589	2647	2704	2761	2818	2875	2933
91	2990	3047	3104	3162	3219	3276	3333	3390	3448	3505̄
92	3562	3619	3676	3734	3791	3848	3905	3962	4020	4077
93	4134	4191	4248	4306	4363	4420	4477	4534	4592	4649
94	4706	4763	4820	4877	4935̄	4992	5049	5106	5163	5221
95	5278	5335̄	5392	5449	5507	5564	5621	5678	5735	5792
96	5850	5907	5964	6021	6078	6135	6193	6250	6307	6364
97	6421	6478	6536	6593	6650	6707	6764	6821	6879	6936
98	6993	7050	7107	7164	7222	7279	7336	7393	7450	7507
99	7564	7622	7679	7736	7793	7850	7907	7964	8022	8079
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P. P.

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7600	880 8136	8193	8250	8307	8364	8422	8479	8536	8593	8650	
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02	9279	9336	9393	9450	9507	9564	9621	9679	9736	9793	
03	9850	9907	9964	0̄021	0̄078	0̄136	0̄193	0̄250	0̄307	0̄364	
04	881 0421	0478	0535	0592	0650	0707	0764	0821	0878	0935	
05	0992	1049	1106	1163	1221	1278	1335̄	1392	1449	1506	
06	1563	1620	1677	1735̄	1792	1849	1906	1963	2020	2077	
07	2134	2191	2248	2305	2363	2420	2477	2534	2591	2648	
08	2705	2762	2819	2876	2933	2990	3048	3105̄	3162	3219	
09	3276	3333	3390	3447	3504	3561	3618	3675	3732	3789	
7610	3847	3904	3961	4018	4075̄	4132	4189	4246	4303	4360	
11	4417	4474	4531	4588	4645	4703	4760	4817	4874	4931	
12	4988	5045̄	5102	5159	5216	5273	5330	5387	5444	5501	58 1 5.8 2 11.6 3 17.4 4 23.2 5 29.0 6 34.8 7 40.6 8 46.4 9 52.2
13	5558	5615	5672	5729	5786	5844	5901	5958	6015̄	6072	
14	6129	6186	6243	6300	6357	6414	6471	6528	6585	6642	
15	6699	6756	6813	6870	6927	6984	7041	7098	7155	7212	
16	7269	7326	7383	7440	7497	7554	7611	7669	7726	7783	
17	7840	7897	7954	8011	8068	8125̄	8182	8239	8296	8353	
18	8410	8467	8524	8581	8638	8695̄	8752	8809	8866	8923	
19	8980	9037	9094	9151	9208	9265̄	9322	9379	9436	9493	
7620	9550	9607	9664	9721	9778	9835̄	9892	9949	0̄006	0̄063	
21	882 0120	0177	0234	0291	0348	0405̄	0462	0519	0575	0632	
22	0689	0746	0803	0860	0917	0974	1031	1088	1145	1202	
23	1259	1316	1373	1430	1487	1544	1601	1658	1715̄	1772	
24	1829	1886	1943	2000	2057	2114	2171	2228	2285̄	2342	
25	2398	2455	2512	2569	2626	2683	2740	2797	2854	2911	
26	2968	3025̄	3082	3139	3196	3253	3310	3367	3424	3481	
27	3537	3594	3651	3708	3765	3822	3879	3936	3993	4050	
28	4107	4164	4221	4278	4335̄	4392	4448	4505	4562	4619	
29	4676	4733	4790	4847	4904	4961	5018	5075̄	5132	5188	
7630	5245	5302	5359	5416	5473	5530	5587	5644	5701	5758	
31	5815̄	5871	5928	5985	6042	6099	6156	6213	6270	6327	
32	6384	6441	6497	6554	6611	6668	6725	6782	6839	6896	57 1 5.7 2 11.4 3 17.1 4 22.8 5 28.5 6 34.2 7 39.9 8 45.6 9 51.3
33	6953	7010	7066	7123	7180	7237	7294	7351	7408	7465̄	
34	7522	7578	7635	7692	7749	7806	7863	7920	7977	8034	
35	8090	8147	8204	8261	8318	8375̄	8432	8489	8545	8602	
36	8659	8716	8773	8830	8887	8944	9000	9057	9114	9171	
37	9228	9285̄	9342	9399	9455	9512	9569	9626	9683	9740	
38	9797	9853	9910	9967	0̄024	0̄081	0̄138	0̄195̄	0̄251	0̄308	
39	883 0365	0422	0479	0536	0593	0649	0706	0763	0820	0877	
7640	0934	0990	1047	1104	1161	1218	1275̄	1331	1388	1445	
41	1502	1559	1616	1673	1729	1786	1843	1900	1957	2014	
42	2070	2127	2184	2241	2298	2354	2411	2468	2525̄	2582	
43	2639	2695	2752	2809	2866	2923	2980	3036	3093	3150	
44	3207	3264	3320	3377	3434	3491	3548	3604	3661	3718	
45	3775̄	3832	3889	3945	4002	4059	4116	4173	4229	4286	
46	4343	4400	4457	4513	4570	4627	4684	4741	4797	4854	
47	4911	4968	5024	5081	5138	5195̄	5252	5308	5365	5422	
48	5479	5536	5592	5649	5706	5763	5819	5876	5933	5990	
49	6047	6103	6160	6217	6274	6330	6387	6444	6501	6558	
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7650	883 6614	6671	6728	6785̄	6841	6898	6955̄	7012	7068	7125	
51	7182	7239	7296	7352	7409	7466	7523	7579	7636	7693	
52	7750	7806	7863	7920	7977	8033	8090	8147	8204	8260	
53	8317	8374	8431	8487	8544	8601	8658	8714	8771	8828	
54	8885̄	8941	8998	9055̄	9112	9168	9225	9282	9338	9395	
55	9452	9509	9565	9622	9679	9736	9792	9849	9906	9963	
56	884 0019	0076	0133	0189	0246	0303	0360	0416	0473	0530	
57	0586	0643	0700	0757	0813	0870	0927	0983	1040	1097	
58	1154	1210	1267	1324	1380	1437	1494	1551	1607	1664	
59	1721	1777	1834	1891	1948	2004	2061	2118	2174	2231	
7660	2288	2344	2401	2458	2514	2571	2628	2685̄	2741	2798	
61	2855̄	2911	2968	3025̄	3081	3138	3195̄	3251	3308	3365̄	57 1 5.7 2 11.4 3 17.1 4 22.8 5 28.5 6 34.2 7 39.9 8 45.6 9 51.3
62	3421	3478	3535̄	3592	3648	3705̄	3762	3818	3875̄	3932	
63	3988	4045̄	4102	4158	4215̄	4272	4328	4385̄	4442	4498	
64	4555̄	4612	4668	4725̄	4782	4838	4895̄	4952	5008	5065̄	
65	5122	5178	5235̄	5292	5348	5405̄	5462	5518	5575̄	5631	
66	5688	5745̄	5801	5858	5915̄	5971	6028	6085̄	6141	6198	
67	6255̄	6311	6368	6425̄	6481	6538	6594	6651	6708	6764	
68	6821	6878	6934	6991	7048	7104	7161	7217	7274	7331	
69	7387	7444	7501	7557	7614	7671	7727	7784	7840	7897	
7670	7954	8010	8067	8124	8180	8237	8293	8350	8407	8463	
71	8520	8576	8633	8690	8746	8803	8860	8916	8973	9029	
72	9086	9143	9199	9256	9312	9369	9426	9482	9539	9595	
73	9652	9709	9765	9822	9878	9935̄	9992	0̄048	0̄105̄	0̄161	
74	885 0218	0275̄	0331	0388	0444	0501	0557	0614	0671	0727	
75	0784	0840	0897	0954	1010	1067	1123	1180	1237	1293	
76	1350	1406	1463	1519	1576	1633	1689	1746	1802	1859	
77	1915	1972	2029	2085	2142	2198	2255̄	2311	2368	2425̄	
78	2481	2538	2594	2651	2707	2764	2820	2877	2934	2990	
79	3047	3103	3160	3216	3273	3329	3386	3443	3499	3556	
7680	3612	3669	3725	3782	3838	3895̄	3951	4008	4065̄	4121	
81	4178	4234	4291	4347	4404	4460	4517	4573	4630	4686	56 1 5.6 2 11.2 3 16.8 4 22.4 5 28.0 6 33.6 7 39.2 8 44.8 9 50.4
82	4743	4800	4856	4913	4969	5026	5082	5139	5195	5252	
83	5308	5365̄	5421	5478	5534	5591	5647	5704	5761	5817	
84	5874	5930	5987	6043	6100	6156	6213	6269	6326	6382	
85	6439	6495	6552	6608	6665̄	6721	6778	6834	6891	6947	
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87	7569	7625	7682	7738	7795̄	7851	7908	7964	8021	8077	
88	8134	8190	8247	8303	8360	8416	8473	8529	8586	8642	
89	8699	8755	8812	8868	8925̄	8981	9037	9094	9150	9207	
7690	9263	9320	9376	9433	9489	9546	9602	9659	9715	9772	
91	9828	9885̄	9941	9998	0̄054	0̄110	0̄167	0̄223	0̄280	0̄336	
92	886 0393	0449	0506	0562	0619	0675	0732	0788	0844	0901	
93	0957	1014	1070	1127	1183	1240	1296	1352	1409	1465	
94	1522	1578	1635̄	1691	1748	1804	1860	1917	1973	2030	
95	2086	2143	2199	2256	2312	2368	2425̄	2481	2538	2594	
96	2651	2707	2763	2820	2876	2933	2989	3046	3102	3158	
97	3215̄	3271	3328	3384	3441	3497	3553	3610	3666	3723	
98	3779	3835	3892	3948	4005̄	4061	4118	4174	4230	4287	
99	4343	4400	4456	4512	4569	4625	4682	4738	4794	4851	
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7700	886 4907	4964	5020	5076	5133	5189	5246	5302	5358	5415̄
01	5471	5528	5584	5640	5697	5753	5810	5866	5922	5979
02	6035	6092	6148	6204	6261	6317	6373	6430	6486	6543
03	6599	6655	6712	6768	6824	6881	6937	6994	7050	7106
04	7163	7219	7275	7332	7388	7445̄	7501	7557	7614	7670
05	7726	7783	7839	7896	7952	8008	8065̄	8121	8177	8234
06	8290	8346	8403	8459	8515	8572	8628	8685̄	8741	8797
07	8854	8910	8966	9023	9079	9135	9192	9248	9304	9361
08	9417	9473	9530	9586	9642	9699	9755	9811	9868	9924
09	9980	0̄037	0̄093	0̄149	0̄206	0̄262	0̄318	0̄375̄	0̄431	0̄487
7710	887 0544	0600	0656	0713	0769	0825	0882	0938	0994	1051
11	1107	1163	1220	1276	1332	1389	1445̄	1501	1558	1614
12	1670	1727	1783	1839	1895	1952	2008	2064	2121	2177
13	2233	2290	2346	2402	2459	2515̄	2571	2627	2684	2740
14	2796	2853	2909	2965	3022	3078	3134	3190	3247	3303
15	3359	3416	3472	3528	3584	3641	3697	3753	3810	3866
16	3922	3978	4035̄	4091	4147	4204	4260	4316	4372	4429
17	4485	4541	4598	4654	4710	4766	4823	4879	4935	4991
18	5048	5104	5160	5217	5273	5329	5385	5442	5498	5554
19	5610	5667	5723	5779	5835	5892	5948	6004	6060	6117
7720	6173	6229	6286	6342	6398	6454	6511	6567	6623	6679
21	6736	6792	6848	6904	6961	7017	7073	7129	7185	7242
22	7298	7354	7410	7467	7523	7579	7635	7692	7748	7804
23	7860	7917	7973	8029	8085	8142	8198	8254	8310	8366
24	8423	8479	8535	8591	8648	8704	8760	8816	8872	8929
25	8985̄	9041	9097	9154	9210	9266	9322	9378	9435̄	9491
26	9547	9603	9659	9716	9772	9828	9884	9941	9997	0̄053
27	888 0109	0165	0222	0278	0334	0390	0446	0503	0559	0615̄
28	0671	0727	0784	0840	0896	0952	1008	1064	1121	1177
29	1233	1289	1345	1402	1458	1514	1570	1626	1683	1739
7730	1795̄	1851	1907	1963	2020	2076	2132	2188	2244	2301
31	2357	2413	2469	2525	2581	2638	2694	2750	2806	2862
32	2918	2975̄	3031	3087	3143	3199	3255	3312	3368	3424
33	3480	3536	3592	3649	3705̄	3761	3817	3873	3929	3986
34	4042	4098	4154	4210	4266	4322	4379	4435̄	4491	4547
35	4603	4659	4715	4772	4828	4884	4940	4996	5052	5108
36	5165̄	5221	5277	5333	5389	5445	5501	5558	5614	5670
37	5726	5782	5838	5894	5950	6007	6063	6119	6175	6231
38	6287	6343	6400	6456	6512	6568	6624	6680	6736	6792
39	6848	6905̄	6961	7017	7073	7129	7185	7241	7297	7353
7740	7410	7466	7522	7578	7634	7690	7746	7802	7858	7915̄
41	7971	8027	8083	8139	8195	8251	8307	8363	8419	8476
42	8532	8588	8644	8700	8756	8812	8868	8924	8980	9037
43	9093	9149	9205̄	9261	9317	9373	9429	9485	9541	9597
44	9653	9710	9766	9822	9878	9934	9990	0̄046	0̄102	0̄158
45	889 0214	0270	0326	0382	0439	0495̄	0551	0607	0663	0719
46	0775̄	0831	0887	0943	0999	1055	1111	1167	1223	1279
47	1336	1392	1448	1504	1560	1616	1672	1728	1784	1840
48	1896	1952	2008	2064	2120	2176	2232	2288	2345̄	2401
49	2457	2513	2569	2625̄	2681	2737	2793	2849	2905̄	2961
7750	3017	3073	3129	3185	3241	3297	3353	3409	3465	3521
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P. P.

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P. P.

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7750	889 3017	3073	3129	3185	3241	3297	3353	3409	3465	3521
51	3577	3633	3689	3745	3801	3858	3914	3970	4026	4082
52	4138	4194	4250	4306	4362	4418	4474	4530	4586	4642
53	4698	4754	4810	4866	4922	4978	5034	5090	5146	5202
54	5258	5314	5370	5426	5482	5538	5594	5650	5706	5762
55	5818	5874	5930	5986	6042	6098	6154	6210	6266	6322
56	6378	6434	6490	6546	6602	6658	6714	6770	6826	6882
57	6938	6994	7050	7106	7162	7218	7274	7330	7386	7442
58	7498	7554	7610	7666	7722	7778	7834	7890	7946	8002
59	8058	8113	8169	8225	8281	8337	8393	8449	8505	8561
7760	8617	8673	8729	8785	8841	8897	8953	9009	9065̄	9121
61	9177	9233	9289	9345̄	9401	9457	9513	9569	9624	9680
62	9736	9792	9848	9904	9960	0̄016	0̄072	0̄128	0̄184	0̄240
63	890 0296	0352	0408	0464	0520	0576	0632	0687	0743	0799
64	0855	0911	0967	1023	1079	1135̄	1191	1247	1303	1359
65	1415̄	1471	1526	1582	1638	1694	1750	1806	1862	1918
66	1974	2030	2086	2142	2198	2253	2309	2365	2421	2477
67	2533	2589	2645̄	2701	2757	2813	2869	2924	2980	3036
68	3092	3148	3204	3260	3316	3372	3428	3484	3539	3595
69	3651	3707	3763	3819	3875̄	3931	3987	4043	4098	4154
7770	4210	4266	4322	4378	4434	4490	4546	4601	4657	4713
71	4769	4825̄	4881	4937	4993	5049	5104	5160	5216	5272
72	5328	5384	5440	5496	5551	5607	5663	5719	5775̄	5831
73	5887	5943	5998	6054	6110	6166	6222	6278	6334	6389
74	6445	6501	6557	6613	6669	6725̄	6781	6836	6892	6948
75	7004	7060	7116	7172	7227	7283	7339	7395̄	7451	7507
76	7563	7618	7674	7730	7786	7842	7898	7953	8009	8065
77	8121	8177	8233	8289	8344	8400	8456	8512	8568	8624
78	8679	8735	8791	8847	8903	8959	9014	9070	9126	9182
79	9238	9294	9349	9405	9461	9517	9573	9629	9684	9740
7780	9796	9852	9908	9963	0̄019	0̄075	0̄131	0̄187	0̄243	0̄298
81	891 0354	0410	0466	0522	0577	0633	0689	0745̄	0801	0856
82	0912	0968	1024	1080	1135	1191	1247	1303	1359	1415̄
83	1470	1526	1582	1638	1694	1749	1805	1861	1917	1972
84	2028	2084	2140	2196	2251	2307	2363	2419	2475̄	2530
85	2586	2642	2698	2754	2809	2865	2921	2977	3032	3088
86	3144	3200	3256	3311	3367	3423	3479	3534	3590	3646
87	3702	3758	3813	3869	3925̄	3981	4036	4092	4148	4204
88	4259	4315	4371	4427	4482	4538	4594	4650	4706	4761
89	4817	4873	4929	4984	5040	5096	5152	5207	5263	5319
7790	5375̄	5430	5486	5542	5598	5653	5709	5765̄	5821	5876
91	5932	5988	6044	6099	6155	6211	6266	6322	6378	6434
92	6489	6545	6601	6657	6712	6768	6824	6880	6935	6991
93	7047	7102	7158	7214	7270	7325	7381	7437	7493	7548
94	7604	7660	7715	7771	7827	7883	7938	7994	8050	8105
95	8161	8217	8273	8328	8384	8440	8495	8551	8607	8663
96	8718	8774	8830	8885	8941	8997	9053	9108	9164	9220
97	9275	9331	9387	9442	9498	9554	9610	9665	9721	9777
98	9832	9888	9944	9999	0̄055	0̄111	0̄166	0̄222	0̄278	0̄334
99	892 0389	0445̄	0501	0556	0612	0668	0723	0779	0835̄	0890
7800	0946	1002	1057	1113	1169	1224	1280	1336	1391	1447
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P. P.

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9	50.4

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9	49.5

P. P.

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7800	892 0946	1002	1057	1113	1169	1224	1280	1336	1391	1447	
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02	2059	2115	2171	2226	2282	2338	2393	2449	2505̄	2560	
03	2616	2672	2727	2783	2839	2894	2950	3006	3061	3117	
04	3173	3228	3284	3340	3395	3451	3506	3562	3618	3673	
05	3729	3785̄	3840	3896	3952	4007	4063	4119	4174	4230	
06	4285	4341	4397	4452	4508	4564	4619	4675̄	4731	4786	
07	4842	4897	4953	5009	5064	5120	5176	5231	5287	5342	
08	5398	5454	5509	5565̄	5621	5676	5732	5787	5843	5899	
09	5954	6010	6065	6121	6177	6232	6288	6344	6399	6455̄	
7810	6510	6566	6622	6677	6733	6788	6844	6900	6955	7011	
11	7066	7122	7178	7233	7289	7344	7400	7456	7511	7567	56 1 5.6 2 11.2 3 16.8 4 22.4 5 28.0 6 33.6 7 39.2 8 44.8 9 50.4
12	7622	7678	7734	7789	7845̄	7900	7956	8011	8067	8123	
13	8178	8234	8289	8345̄	8401	8456	8512	8567	8623	8678	
14	8734	8790	8845	8901	8956	9012	9068	9123	9179	9234	
15	9290	9345	9401	9457	9512	9568	9623	9679	9734	9790	
16	9846	9901	9957	0̄012	0̄068	0̄123	0̄179	0̄234	0̄290	0̄346	
17	893 0401	0457	0512	0568	0623	0679	0734	0790	0846	0901	
18	0957	1012	1068	1123	1179	1234	1290	1345	1401	1457	
19	1512	1568	1623	1679	1734	1790	1845	1901	1956	2012	
7820	2068	2123	2179	2234	2290	2345	2401	2456	2512	2567	
21	2623	2678	2734	2789	2845̄	2900	2956	3012	3067	3123	
22	3178	3234	3289	3345̄	3400	3456	3511	3567	3622	3678	
23	3733	3789	3844	3900	3955	4011	4066	4122	4177	4233	
24	4288	4344	4399	4455̄	4510	4566	4621	4677	4732	4788	
25	4843	4899	4954	5010	5065	5121	5176	5232	5287	5343	
26	5398	5454	5509	5565̄	5620	5676	5731	5787	5842	5898	
27	5953	6009	6064	6120	6175	6231	6286	6342	6397	6453	
28	6508	6564	6619	6675̄	6730	6786	6841	6897	6952	7007	
29	7063	7118	7174	7229	7285̄	7340	7396	7451	7507	7562	
7830	7618	7673	7729	7784	7839	7895̄	7950	8006	8061	8117	
31	8172	8228	8283	8339	8394	8450	8505̄	8560	8616	8671	55 1 5.5 2 11.0 3 16.5 4 22.0 5 27.5 6 33.0 7 38.5 8 44.0 9 49.5
32	8727	8782	8838	8893	8949	9004	9059	9115̄	9170	9226	
33	9281	9337	9392	9448	9503	9558	9614	9669	9725̄	9780	
34	9836	9891	9947	0̄002	0̄057	0̄113	0̄168	0̄224	0̄279	0̄335̄	
35	894 0390	0445	0501	0556	0612	0667	0723	0778	0833	0889	
36	0944	1000	1055	1111	1166	1221	1277	1332	1388	1443	
37	1498	1554	1609	1665̄	1720	1776	1831	1886	1942	1997	
38	2053	2108	2163	2219	2274	2330	2385	2440	2496	2551	
39	2607	2662	2717	2773	2828	2884	2939	2994	3050	3105	
7840	3161	3216	3271	3327	3382	3438	3493	3548	3604	3659	
41	3715̄	3770	3825	3881	3936	3991	4047	4102	4158	4213	
42	4268	4324	4379	4435̄	4490	4545	4601	4656	4711	4767	
43	4822	4878	4933	4988	5044	5099	5154	5210	5265	5320	
44	5376	5431	5487	5542	5597	5653	5708	5763	5819	5874	
45	5929	5985̄	6040	6096	6151	6206	6262	6317	6372	6428	
46	6483	6538	6594	6649	6704	6760	6815	6870	6926	6981	
47	7037	7092	7147	7203	7258	7313	7369	7424	7479	7535̄	
48	7590	7645	7701	7756	7811	7867	7922	7977	8033	8088	
49	8143	8199	8254	8309	8365	8420	8475	8531	8586	8641	
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51	9250	9305	9360	9416	9471	9526	9582	9637	9692	9748	
52	9803	9858	9914	9969	0̄024	0̄079	0̄135̄	0̄190	0̄245	0̄301	
53	895 0356	0411	0467	0522	0577	0632	0688	0743	0798	0854	
54	0909	0964	1020	1075̄	1130	1185	1241	1296	1351	1407	
55	1462	1517	1572	1628	1683	1738	1794	1849	1904	1959	
56	2015̄	2070	2125	2181	2236	2291	2346	2402	2457	2512	
57	2568	2623	2678	2733	2789	2844	2899	2954	3010	3065̄	
58	3120	3176	3231	3286	3341	3397	3452	3507	3562	3618	
59	3673	3728	3783	3839	3894	3949	4004	4060	4115̄	4170	
7860	4225	4281	4336	4391	4446	4502	4557	4612	4667	4723	
61	4778	4833	4888	4944	4999	5054	5109	5165̄	5220	5275	56 1 5.6 2 11.2 3 16.8 4 22.4 5 28.0 6 33.6 7 39.2 8 44.8 9 50.4
62	5330	5386	5441	5496	5551	5607	5662	5717	5772	5828	
63	5883	5938	5993	6048	6104	6159	6214	6269	6325̄	6380	
64	6435	6490	6545	6601	6656	6711	6766	6822	6877	6932	
65	6987	7042	7098	7153	7208	7263	7319	7374	7429	7484	
66	7539	7595̄	7650	7705	7760	7815	7871	7926	7981	8036	
67	8092	8147	8202	8257	8312	8368	8423	8478	8533	8588	
68	8644	8699	8754	8809	8864	8919	8975̄	9030	9085	9140	
69	9195	9251	9306	9361	9416	9471	9527	9582	9637	9692	
7870	9747	9803	9858	9913	9968	0̄023	0̄078	0̄134	0̄189	0̄244	
71	896 0299	0354	0409	0465̄	0520	0575̄	0630	0685	0741	0796	
72	0851	0906	0961	1016	1072	1127	1182	1237	1292	1347	
73	1403	1458	1513	1568	1623	1678	1733	1789	1844	1899	
74	1954	2009	2064	2120	2175̄	2230	2285	2340	2395	2450	
75	2506	2561	2616	2671	2726	2781	2837	2892	2947	3002	
76	3057	3112	3167	3222	3278	3333	3388	3443	3498	3553	
77	3608	3664	3719	3774	3829	3884	3939	3994	4050	4105̄	
78	4160	4215̄	4270	4325	4380	4435	4491	4546	4601	4656	
79	4711	4766	4821	4876	4931	4987	5042	5097	5152	5207	
7880	5262	5317	5372	5428	5483	5538	5593	5648	5703	5758	
81	5813	5868	5923	5979	6034	6089	6144	6199	6254	6309	55 1 5.5 2 11.0 3 16.5 4 22.0 5 27.5 6 33.0 7 38.5 8 44.0 9 49.5
82	6364	6419	6475̄	6530	6585̄	6640	6695̄	6750	6805	6860	
83	6915	6970	7025	7081	7136	7191	7246	7301	7356	7411	
84	7466	7521	7576	7631	7686	7742	7797	7852	7907	7962	
85	8017	8072	8127	8182	8237	8292	8347	8403	8458	8513	
86	8568	8623	8678	8733	8788	8843	8898	8953	9008	9063	
87	9118	9173	9229	9284	9339	9394	9449	9504	9559	9614	
88	9669	9724	9779	9834	9889	9944	9999	0̄054	0̄109	0̄165̄	
89	897 0220	0275̄	0330	0385̄	0440	0495̄	0550	0605̄	0660	0715̄	
7890	0770	0825	0880	0935	0990	1045	1100	1155	1210	1265	
91	1320	1375	1431	1486	1541	1596	1651	1706	1761	1816	
92	1871	1926	1981	2036	2091	2146	2201	2256	2311	2366	
93	2421	2476	2531	2586	2641	2696	2751	2806	2861	2916	
94	2971	3026	3081	3136	3191	3246	3301	3356	3411	3466	
95	3521	3576	3631	3686	3741	3796	3851	3906	3961	4016	
96	4071	4126	4181	4236	4291	4346	4401	4456	4511	4566	
97	4621	4676	4731	4786	4841	4896	4951	5006	5061	5116	
98	5171	5226	5281	5336	5391	5446	5501	5556	5611	5666	
99	5721	5776	5831	5886	5941	5996	6051	6106	6161	6216	
7900	6271	6326	6381	6436	6491	6546	6601	6656	6711	6766	
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7900 — 7950

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01	6821	6876	6931	6986	7040	7095	7150	7205	7260	7315
02	7370	7425	7480	7535	7590	7645	7700	7755̄	7810	7865̄
03	7920	7975̄	8030	8085̄	8140	8195̄	8250	8304	8359	8414
04	8469	8524	8579	8634	8689	8744	8799	8854	8909	8964
05	9019	9074	9129	9184	9238	9293	9348	9403	9458	9513
06	9568	9623	9678	9733	9788	9843	9898	9953	0̄008	0̄062
07	898 0117	0172	0227	0282	0337	0392	0447	0502	0557	0612
08	0667	0722	0776	0831	0886	0941	0996	1051	1106	1161
09	1216	1271	1326	1380	1435	1490	1545	1600	1655	1710
7910	1765̄	1820	1875̄	1930	1984	2039	2094	2149	2204	2259
11	2314	2369	2424	2479	2533	2588	2643	2698	2753	2808
12	2863	2918	2973	3027	3082	3137	3192	3247	3302	3357
13	3412	3467	3521	3576	3631	3686	3741	3796	3851	3906
14	3960	4015	4070	4125	4180	4235̄	4290	4345̄	4399	4454
15	4509	4564	4619	4674	4729	4784	4838	4893	4948	5003
16	5058	5113	5168	5222	5277	5332	5387	5442	5497	5552
17	5606	5661	5716	5771	5826	5881	5936	5990	6045	6100
18	6155̄	6210	6265̄	6320	6374	6429	6484	6539	6594	6649
19	6703	6758	6813	6868	6923	6978	7032	7087	7142	7197
7920	7252	7307	7361	7416	7471	7526	7581	7636	7690	7745
21	7800	7855̄	7910	7965̄	8019	8074	8129	8184	8239	8294
22	8348	8403	8458	8513	8568	8622	8677	8732	8787	8842
23	8897	8951	9006	9061	9116	9171	9225	9280	9335	9390
24	9445̄	9499	9554	9609	9664	9719	9774	9828	9883	9938
25	9993	0̄048	0̄102	0̄157	0̄212	0̄267	0̄321	0̄376	0̄431	0̄486
26	899 0541	0595	0650	0705	0760	0815̄	0869	0924	0979	1034
27	1089	1143	1198	1253	1308	1363	1417	1472	1527	1582
28	1636	1691	1746	1801	1856	1910	1965	2020	2075̄	2129
29	2184	2239	2294	2348	2403	2458	2513	2568	2622	2677
7930	2732	2787	2841	2896	2951	3006	3060	3115	3170	3225̄
31	3279	3334	3389	3444	3499	3553	3608	3663	3718	3772
32	3827	3882	3937	3991	4046	4101	4156	4210	4265	4320
33	4375̄	4429	4484	4539	4594	4648	4703	4758	4812	4867
34	4922	4977	5031	5086	5141	5196	5250	5305	5360	5415̄
35	5469	5524	5579	5634	5688	5743	5798	5852	5907	5962
36	6017	6071	6126	6181	6235	6290	6345̄	6400	6454	6509
37	6564	6619	6673	6728	6783	6837	6892	6947	7002	7056
38	7111	7166	7220	7275	7330	7384	7439	7494	7549	7603
39	7658	7713	7767	7822	7877	7932	7986	8041	8096	8150
7940	8205	8260	8314	8369	8424	8479	8533	8588	8643	8697
41	8752	8807	8861	8916	8971	9025	9080	9135̄	9189	9244
42	9299	9354	9408	9463	9518	9572	9627	9682	9736	9791
43	9846	9900	9955̄	0̄010	0̄064	0̄119	0̄174	0̄228	0̄283	0̄338
44	900 0392	0447	0502	0556	0611	0666	0720	0775	0830	0884
45	0939	0994	1048	1103	1158	1212	1267	1322	1376	1431
46	1486	1540	1595̄	1650	1704	1759	1814	1868	1923	1977
47	2032	2087	2141	2196	2251	2305	2360	2415̄	2469	2524
48	2579	2633	2688	2743	2797	2852	2906	2961	3016	3070
49	3125̄	3180	3234	3289	3344	3398	3453	3507	3562	3617
7950	3671	3726	3781	3835	3890	3944	3999	4054	4108	4163
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P. P.

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7950	900 3671	3726	3781	3835	3890	3944	3999	4054	4108	4163	
51	4218	4272	4327	4381	4436	4491	4545	4600	4654	4709	
52	4764	4818	4873	4928	4982	5037	5091	5146	5201	5255	
53	5310	5364	5419	5474	5528	5583	5637	5692	5747	5801	
54	5856	5910	5965	6020	6074	6129	6183	6238	6293	6347	
55	6402	6456	6511	6566	6620	6675̅	6729	6784	6839	6893	
56	6948	7002	7057	7112	7166	7221	7275	7330	7384	7439	
57	7494	7548	7603	7657	7712	7766	7821	7876	7930	7985̅	
58	8039	8094	8148	8203	8258	8312	8367	8421	8476	8530	
59	8585	8640	8694	8749	8803	8858	8912	8967	9022	9076	
7960	9131	9185	9240	9294	9349	9403	9458	9513	9567	9622	
61	9676	9731	9785	9840	9894	9949	0̅004	0̅058	0̅113	0̅167	55 1 5.5 2 11.0 3 16.5 4 22.0 5 27.5 6 33.0 7 38.5 8 44.0 9 49.5
62	901 0222	0276	0331	0385	0440	0494	0549	0604	0658	0713	
63	0767	0822	0876	0931	0985	1040	1094	1149	1203	1258	
64	1313	1367	1422	1476	1531	1585	1640	1694	1749	1803	
65	1858	1912	1967	2021	2076	2130	2185̅	2239	2294	2349	
66	2403	2458	2512	2567	2621	2676	2730	2785̅	2839	2894	
67	2948	3003	3057	3112	3166	3221	3275	3330	3384	3439	
68	3493	3548	3602	3657	3711	3766	3820	3875̅	3929	3984	
69	4038	4093	4147	4202	4256	4311	4365	4420	4474	4529	
7970	4583	4638	4692	4747	4801	4856	4910	4965̅	5019	5074	
71	5128	5183	5237	5292	5346	5401	5455̅	5509	5564	5618	
72	5673	5727	5782	5836	5891	5945	6000	6054	6109	6163	
73	6218	6272	6327	6381	6436	6490	6544	6599	6653	6708	
74	6762	6817	6871	6926	6980	7035̅	7089	7144	7198	7252	
75	7307	7361	7416	7470	7525̅	7579	7634	7688	7743	7797	
76	7851	7906	7960	8015̅	8069	8124	8178	8233	8287	8341	
77	8396	8450	8505̅	8559	8614	8668	8723	8777	8831	8886	
78	8940	8995̅	9049	9104	9158	9212	9267	9321	9376	9430	
79	9485̅	9539	9594	9648	9702	9757	9811	9866	9920	9974	
7980	902 0029	0083	0138	0192	0247	0301	0355	0410	0464	0519	
81	0573	0628	0682	0736	0791	0845	0900	0954	1008	1063	54 1 5.4 2 10.8 3 16.2 4 21.6 5 27.0 6 32.4 7 37.8 8 43.2 9 48.6
82	1117	1172	1226	1280	1335̅	1389	1444	1498	1552	1607	
83	1661	1716	1770	1824	1879	1933	1988	2042	2096	2151	
84	2205	2260	2314	2368	2423	2477	2532	2586	2640	2695̅	
85	2749	2804	2858	2912	2967	3021	3076	3130	3184	3239	
86	3293	3347	3402	3456	3511	3565	3619	3674	3728	3782	
87	3837	3891	3946	4000	4054	4109	4163	4217	4272	4326	
88	4381	4435̅	4489	4544	4598	4652	4707	4761	4815	4870	
89	4924	4979	5033	5087	5142	5196	5250	5305̅	5359	5413	
7990	5468	5522	5577	5631	5685	5740	5794	5848	5903	5957	
91	6011	6066	6120	6174	6229	6283	6337	6392	6446	6500	
92	6555̅	6609	6663	6718	6772	6826	6881	6935	6989	7044	
93	7098	7152	7207	7261	7315	7370	7424	7478	7533	7587	
94	7641	7696	7750	7804	7859	7913	7967	8022	8076	8130	
95	8185̅	8239	8293	8348	8402	8456	8511	8565̅	8619	8674	
96	8728	8782	8836	8891	8945	8999	9054	9108	9162	9217	
97	9271	9325	9380	9434	9488	9542	9597	9651	9705	9760	
98	9814	9868	9923	9977	0̅031	0̅085	0̅140	0̅194	0̅248	0̅303	
99	903 0357	0411	0466	0520	0574	0628	0683	0737	0791	0846	
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02	1985	2040	2094	2148	2203	2257	2311	2365	2420	2474	
03	2528	2582	2637	2691	2745	2799	2854	2908	2962	3017	
04	3071	3125	3179	3234	3288	3342	3396	3451	3505̄	3559	
05	3613	3668	3722	3776	3830	3885̄	3939	3993	4047	4102	
06	4156	4210	4264	4319	4373	4427	4481	4536	4590	4644	
07	4698	4753	4807	4861	4915	4969	5024	5078	5132	5186	
08	5241	5295̄	5349	5403	5458	5512	5566	5620	5674	5729	
09	5783	5837	5891	5946	6000	6054	6108	6163	6217	6271	
8010	6325	6379	6434	6488	6542	6596	6650	6705̄	6759	6813	
11	6867	6922	6976	7030	7084	7138	7193	7247	7301	7355	55 1 5.5 2 11.0 3 16.5 4 22.0 5 27.5 6 33.0 7 38.5 8 44.0 9 49.5
12	7409	7464	7518	7572	7626	7680	7735̄	7789	7843	7897	
13	7951	8006	8060	8114	8168	8222	8277	8331	8385̄	8439	
14	8493	8548	8602	8656	8710	8764	8819	8873	8927	8981	
15	9035	9089	9144	9198	9252	9306	9360	9415̄	9469	9523	
16	9577	9631	9685	9740	9794	9848	9902	9956	0̄010	0̄065̄	
17	904 0119	0173	0227	0281	0336	0390	0444	0498	0552	0606	
18	0661	0715̄	0769	0823	0877	0931	0985	1040	1094	1148	
19	1202	1256	1310	1365̄	1419	1473	1527	1581	1635	1690	
8020	1744	1798	1852	1906	1960	2014	2069	2123	2177	2231	
21	2285	2339	2393	2448	2502	2556	2610	2664	2718	2772	
22	2827	2881	2935̄	2989	3043	3097	3151	3206	3260	3314	
23	3368	3422	3476	3530	3584	3639	3693	3747	3801	3855	
24	3909	3963	4017	4072	4126	4180	4234	4288	4342	4396	
25	4450	4505̄	4559	4613	4667	4721	4775	4829	4883	4937	
26	4992	5046	5100	5154	5208	5262	5316	5370	5424	5479	
27	5533	5587	5641	5695̄	5749	5803	5857	5911	5965	6020	
28	6074	6128	6182	6236	6290	6344	6398	6452	6506	6560	
29	6615̄	6669	6723	6777	6831	6885	6939	6993	7047	7101	
8030	7155	7210	7264	7318	7372	7426	7480	7534	7588	7642	
31	7696	7750	7804	7858	7913	7967	8021	8075̄	8129	8183	54 1 5.4 2 10.8 3 16.2 4 21.6 5 27.0 6 32.4 7 37.8 8 43.2 9 48.6
32	8237	8291	8345	8399	8453	8507	8561	8615	8670	8724	
33	8778	8832	8886	8940	8994	9048	9102	9156	9210	9264	
34	9318	9372	9426	9480	9534	9589	9643	9697	9751	9805̄	
35	9859	9913	9967	0̄021	0̄075	0̄129	0̄183	0̄237	0̄291	0̄345	
36	905 0399	0453	0507	0561	0615	0669	0724	0778	0832	0886	
37	0940	0994	1048	1102	1156	1210	1264	1318	1372	1426	
38	1480	1534	1588	1642	1696	1750	1804	1858	1912	1966	
39	2020	2074	2128	2182	2236	2290	2344	2398	2452	2506	
8040	2560	2615̄	2669	2723	2777	2831	2885̄	2939	2993	3047	
41	3101	3155̄	3209	3263	3317	3371	3425̄	3479	3533	3587	
42	3641	3695̄	3749	3803	3857	3911	3965̄	4019	4073	4127	
43	4181	4235̄	4289	4343	4397	4451	4505̄	4559	4613	4667	
44	4721	4775̄	4829	4883	4937	4991	5045̄	5099	5153	5207	
45	5260	5314	5368	5422	5476	5530	5584	5638	5692	5746	
46	5800	5854	5908	5962	6016	6070	6124	6178	6232	6286	
47	6340	6394	6448	6502	6556	6610	6664	6718	6772	6826	
48	6880	6934	6988	7042	7096	7149	7203	7257	7311	7365	
49	7419	7473	7527	7581	7635	7689	7743	7797	7851	7905̄	
8050	7959	8013	8067	8121	8175̄	8229	8282	8336	8390	8444	
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8050 — 8100

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52	9038	9092	9146	9199	9253	9307	9361	9415	9469	9523	
53	9577	9631	968̄5	9739	9793	9847	9901	9954	0̄008	0̄062	
54	906 0116	0170	0224	0278	0332	0386	0440	0494	0548	0602	
55	0655	0709	0763	0817	0871	0925	0979	1033	1087	1141	
56	119̄5	1248	1302	1356	1410	1464	1518	1572	1626	1680	
57	1734	1788	1841	1895	1949	2003	2057	2111	216̄5	2219	
58	2273	2327	2380	2434	2488	2542	2596	2650	2704	2758	
59	2812	2865	2919	2973	3027	3081	313̄5	3189	3243	3297	
8060	3350	3404	3458	3512	3566	3620	3674	3728	3781	3835	
61	3889	3943	3997	4051	410̄5	4159	4212	4266	4320	4374	54
62	4428	4482	4536	4590	4643	4697	4751	4805	4859	4913	1 5.4
63	4967	5020	5074	5128	5182	5236	5290	5344	5397	5451	2 10.8
64	5505	5559	5613	5667	5721	5774	5828	5882	5936	5990	3 16.2
65	6044	6098	6151	6205	6259	6313	6367	6421	6474	6528	4 21.6
66	6582	6636	6690	6744	6798	6851	6905	6959	7013	7067	5 27.0
67	7121	7174	7228	7282	7336	7390	7444	7497	7551	7605	6 32.4
68	7659	7713	7767	7820	7874	7928	7982	8036	8090	8143	7 37.8
69	8197	8251	830̄5	8359	8412	8466	8520	8574	8628	8682	8 43.2
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71	9273	9327	9381	943̄5	9489	9543	9596	9650	9704	9758	
72	9812	9865	9919	9973	0̄027	0̄081	0̄134	0̄188	0̄242	0̄296	
73	907 0350	0403	0457	0511	056̄5	0618	0672	0726	0780	0834	
74	0887	0941	0995	1049	1103	1156	1210	1264	1318	1372	
75	1425	1479	1533	1587	1640	1694	1748	1802	1856	1909	
76	1963	2017	2071	2124	2178	2232	2286	2340	2393	2447	
77	2501	255̄5	2608	2662	2716	2770	2823	2877	2931	298̄5	
78	3038	3092	3146	3200	3254	3307	3361	341̄5	3469	3522	
79	3576	3630	3684	3737	3791	384̄5	3899	3952	4006	4060	
8080	4114	4167	4221	427̄5	4329	4382	4436	4490	4544	4597	
81	4651	470̄5	4759	4812	4866	4920	4974	5027	5081	513̄5	53
82	5188	5242	5296	5350	5403	5457	5511	556̄5	5618	5672	1 5.3
83	5726	5780	5833	5887	5941	5994	6048	6102	6156	6209	2 10.6
84	6263	6317	6370	6424	6478	6532	6585	6639	6693	6747	3 15.9
85	6800	6854	6908	6961	7015	7069	7123	7176	7230	7284	4 21.2
86	7337	7391	744̄5	7498	7552	7606	7660	7713	7767	7821	5 26.5
87	7874	7928	7982	8036	8089	8143	8197	8250	8304	8358	6 31.8
88	8411	8465	8519	8573	8626	8680	8734	8787	8841	8895	7 37.1
89	8948	9002	9056	9109	9163	9217	9270	9324	9378	9432	8 42.4
8090	9485	9539	9593	9646	9700	9754	9807	9861	991̄5	9968	9 47.7
91	908 0022	0076	0129	0183	0237	0290	0344	0398	0451	0505	
92	0559	0612	0666	0720	0773	0827	0881	0934	0988	1042	
93	1095	1149	1203	1256	1310	1364	1417	1471	152̄5	1578	
94	1632	1686	1739	1793	1847	1900	1954	2008	2061	211̄5	
95	2169	2222	2276	2329	2383	2437	2490	2544	2598	2651	
96	270̄5	2759	2812	2866	2920	2973	3027	3080	3134	3188	
97	3241	3295	3349	3402	3456	3510	3563	3617	3670	3724	
98	3778	3831	388̄5	3939	3992	4046	4099	4153	4207	4260	
99	4314	4368	4421	447̄5	4528	4582	4636	4689	4743	4797	
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01	5386	5440	5494	5547	5601	5654	5708	5762	5815	5869	
02	5922	5976	6030	6083	6137	6190	6244	6298	6351	6405	
03	6458	6512	6566	6619	6673	6726	6780	6834	6887	6941	
04	6994	7048	7102	7155	7209	7262	7316	7369	7423	7477	
05	7530	7584	7637	7691	7745	7798	7852	7905	7959	8012	
06	8066	8120	8173	8227	8280	8334	8387	8441	8495	8548	
07	8602	8655	8709	8762	8816	8870	8923	8977	9030	9084	
08	9137	9191	9245	9298	9352	9405	9459	9512	9566	9619	
09	9673	9727	9780	9834	9887	9941	9994	0̄048	0̄101	0̄155	
8110	909 0209	0262	0316	0369	0423	0476	0530	0583	0637	0690	
11	0744	0798	0851	0905	0958	1012	1065	1119	1172	1226	
12	1279	1333	1386	1440	1494	1547	1601	1654	1708	1761	
13	1815	1868	1922	1975	2029	2082	2136	2189	2243	2297	
14	2350	2404	2457	2511	2564	2618	2671	2725	2778	2832	
15	2885	2939	2992	3046	3099	3153	3206	3260	3313	3367	
16	3420	3474	3527	3581	3634	3688	3741	3795	3848	3902	
17	3955	4009	4062	4116	4169	4223	4276	4330	4383	4437	
18	4490	4544	4597	4651	4704	4758	4811	4865	4918	4972	
19	5025	5079	5132	5186	5239	5293	5346	5400	5453	5507	
8120	5560	5614	5667	5721	5774	5828	5881	5935	5988	6042	
21	6095	6149	6202	6256	6309	6362	6416	6469	6523	6576	
22	6630	6683	6737	6790	6844	6897	6951	7004	7058	7111	
23	7165	7218	7271	7325	7378	7432	7485	7539	7592	7646	
24	7699	7753	7806	7860	7913	7966	8020	8073	8127	8180	
25	8234	8287	8341	8394	8447	8501	8554	8608	8661	8715	
26	8768	8822	8875	8929	8982	9035	9089	9142	9196	9249	
27	9303	9356	9409	9463	9516	9570	9623	9677	9730	9784	
28	9837	9890	9944	9997	0̄051	0̄104	0̄158	0̄211	0̄264	0̄318	
29	910 0371	0425	0478	0532	0585	0638	0692	0745	0799	0852	
8130	0905	0959	1012	1066	1119	1173	1226	1279	1333	1386	
31	1440	1493	1546	1600	1653	1707	1760	1813	1867	1920	
32	1974	2027	2081	2134	2187	2241	2294	2348	2401	2454	
33	2508	2561	2615	2668	2721	2775	2828	2882	2935	2988	
34	3042	3095	3148	3202	3255	3309	3362	3415	3469	3522	
35	3576	3629	3682	3736	3789	3842	3896	3949	4003	4056	
36	4109	4163	4216	4270	4323	4376	4430	4483	4536	4590	
37	4643	4697	4750	4803	4857	4910	4963	5017	5070	5123	
38	5177	5230	5284	5337	5390	5444	5497	5550	5604	5657	
39	5710	5764	5817	5871	5924	5977	6031	6084	6137	6191	
8140	6244	6297	6351	6404	6457	6511	6564	6618	6671	6724	
41	6778	6831	6884	6938	6991	7044	7098	7151	7204	7258	
42	7311	7364	7418	7471	7524	7578	7631	7684	7738	7791	
43	7844	7898	7951	8004	8058	8111	8164	8218	8271	8324	
44	8378	8431	8484	8538	8591	8644	8698	8751	8804	8858	
45	8911	8964	9018	9071	9124	9177	9231	9284	9337	9391	
46	9444	9497	9551	9604	9657	9711	9764	9817	9871	9924	
47	9977	0̄030	0̄084	0̄137	0̄190	0̄244	0̄297	0̄350	0̄404	0̄457	
48	911 0510	0564	0617	0670	0723	0777	0830	0883	0937	0990	
49	1043	1096	1150	1203	1256	1310	1363	1416	1470	1523	
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8150 — 8200

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51	2109	2162	2215	2269	2322	2375	2429	2482	2535	2588
52	2642	2695̄	2748	2802	2855̄	2908	2961	3015̄	3068	3121
53	3174	3228	3281	3334	3387	3441	3494	3547	3601	3654
54	3707	3760	3814	3867	3920	3973	4027	4080	4133	4186
55	4240	4293	4346	4399	4453	4506	4559	4612	4666	4719
56	4772	4825	4879	4932	4985	5038	5092	5145̄	5198	5251
57	5305̄	5358	5411	5464	5518	5571	5624	5677	5731	5784
58	5837	5890	5943	5997	6050	6103	6156	6210	6263	6316
59	6369	6423	6476	6529	6582	6635	6689	6742	6795	6848
8160	6902	6955̄	7008	7061	7114	7168	7221	7274	7327	7381
61	7434	7487	7540	7593	7647	7700	7753	7806	7859	7913
62	7966	8019	8072	8126	8179	8232	8285	8338	8392	8445̄
63	8498	8551	8604	8658	8711	8764	8817	8870	8924	8977
64	9030	9083	9136	9190	9243	9296	9349	9402	9456	9509
65	9562	9615	9668	9721	9775̄	9828	9881	9934	9987	0̄041
66	912 0094	0147	0200	0253	0306	0360	0413	0466	0519	0572
67	0626	0679	0732	0785	0838	0891	0945̄	0998	1051	1104
68	1157	1210	1264	1317	1370	1423	1476	1529	1583	1636
69	1689	1742	1795	1848	1902	1955̄	2008	2061	2114	2167
8170	2221	2274	2327	2380	2433	2486	2539	2593	2646	2699
71	2752	2805	2858	2912	2965̄	3018	3071	3124	3177	3230
72	3284	3337	3390	3443	3496	3549	3602	3656	3709	3762
73	3815̄	3868	3921	3974	4028	4081	4134	4187	4240	4293
74	4346	4399	4453	4506	4559	4612	4665	4718	4771	4824
75	4878	4931	4984	5037	5090	5143	5196	5249	5303	5356
76	5409	5462	5515	5568	5621	5674	5728	5781	5834	5887
77	5940	5993	6046	6099	6152	6206	6259	6312	6365̄	6418
78	6471	6524	6577	6630	6683	6737	6790	6843	6896	6949
79	7002	7055	7108	7161	7214	7268	7321	7374	7427	7480
8180	7533	7586	7639	7692	7745	7798	7852	7905̄	7958	8011
81	8064	8117	8170	8223	8276	8329	8382	8436	8489	8542
82	8595̄	8648	8701	8754	8807	8860	8913	8966	9019	9072
83	9126	9179	9232	9285̄	9338	9391	9444	9497	9550	9603
84	9656	9709	9762	9815	9868	9922	9975̄	0̄028	0̄081	0̄134
85	913 0187	0240	0293	0346	0399	0452	0505	0558	0611	0664
86	0717	0770	0824	0877	0930	0983	1036	1089	1142	1195̄
87	1248	1301	1354	1407	1460	1513	1566	1619	1672	1725
88	1778	1831	1884	1937	1990	2044	2097	2150	2203	2256
89	2309	2362	2415̄	2468	2521	2574	2627	2680	2733	2786
8190	2839	2892	2945	2998	3051	3104	3157	3210	3263	3316
91	3369	3422	3475	3528	3581	3634	3687	3740	3793	3846
92	3899	3952	4005	4058	4111	4165̄	4218	4271	4324	4377
93	4430	4483	4536	4589	4642	4695̄	4748	4801	4854	4907
94	4960	5013	5066	5119	5172	5225̄	5278	5331	5384	5437
95	5490	5543	5596	5649	5702	5755̄	5808	5861	5914	5967
96	6019	6072	6125	6178	6231	6284	6337	6390	6443	6496
97	6549	6602	6655	6708	6761	6814	6867	6920	6973	7026
98	7079	7132	7185	7238	7291	7344	7397	7450	7503	7556
99	7609	7662	7715̄	7768	7821	7874	7927	7980	8033	8086
8200	8139	8191	8244	8297	8350	8403	8456	8509	8562	8615
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P. P.

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8200	913 8139	8191	8244	8297	8350	8403	8456	8509	8562	8615	
01	8668	8721	8774	8827	8880	8933	8986	9039	9092	9145̄	
02	9198	9251	9304	9356	9409	9462	9515	9568	9621	9674	
03	9727	9780	9833	9886	9939	9992	0̄045̄	0̄098	0̄151	0̄204	
04	914 0257	0309	0362	0415	0468	0521	0574	0627	0680	0733	
05	0786	0839	0892	0945̄	0998	1050	1103	1156	1209	1262	
06	1315	1368	1421	1474	1527	1580	1633	1686	1738	1791	
07	1844	1897	1950	2003	2056	2109	2162	2215̄	2268	2321	
08	2373	2426	2479	2532	2585	2638	2691	2744	2797	2850	
09	2903	2955	3008	3061	3114	3167	3220	3273	3326	3379	
8210	3432	3484	3537	3590	3643	3696	3749	3802	3855̄	3908	
11	3961	4013	4066	4119	4172	4225̄	4278	4331	4384	4437	53
12	4489	4542	4595	4648	4701	4754	4807	4860	4912	4965	1 5.3
13	5018	5071	5124	5177	5230	5283	5335	5388	5441	5494	2 10.6
14	5547	5600	5653	5706	5758	5811	5864	5917	5970	6023	3 15.9
15	6076	6129	6181	6234	6287	6340	6393	6446	6499	6551	4 21.2
16	6604	6657	6710	6763	6816	6869	6921	6974	7027	7080	5 26.5
17	7133	7186	7239	7291	7344	7397	7450	7503	7556	7609	6 31.8
18	7661	7714	7767	7820	7873	7926	7978	8031	8084	8137	7 37.1
19	8190	8243	8295	8348	8401	8454	8507	8560	8613	8665	8 42.4
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21	9246	9299	9352	9405̄	9458	9511	9563	9616	9669	9722	
22	9775̄	9828	9880	9933	9986	0̄039	0̄092	0̄144	0̄197	0̄250	
23	915 0303	0356	0409	0461	0514	0567	0620	0673	0725	0778	
24	0831	0884	0937	0989	1042	1095	1148	1201	1253	1306	
25	1359	1412	1465̄	1517	1570	1623	1676	1729	1781	1834	
26	1887	1940	1993	2045	2098	2151	2204	2257	2309	2362	
27	2415̄	2468	2521	2573	2626	2679	2732	2784	2837	2890	
28	2943	2996	3048	3101	3154	3207	3260	3312	3365	3418	
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31	4526	4579	4632	4684	4737	4790	4843	4895	4948	5001	52
32	5054	5106	5159	5212	5265̄	5317	5370	5423	5476	5528	1 5.2
33	5581	5634	5687	5739	5792	5845̄	5898	5950	6003	6056	2 10.4
34	6109	6161	6214	6267	6320	6372	6425	6478	6531	6583	3 15.6
35	6636	6689	6742	6794	6847	6900	6952	7005	7058	7111	4 20.8
36	7163	7216	7269	7322	7374	7427	7480	7532	7585	7638	5 26.0
37	7691	7743	7796	7849	7902	7954	8007	8060	8112	8165	6 31.2
38	8218	8271	8323	8376	8429	8481	8534	8587	8640	8692	7 36.4
39	8745	8798	8850	8903	8956	9009	9061	9114	9167	9219	8 41.6
8240	9272	9325̄	9378	9430	9483	9536	9588	9641	9694	9746	9 46.8
41	9799	9852	9905̄	9957	0̄010	0̄063	0̄115	0̄168	0̄221	0̄273	
42	916 0326	0379	0431	0484	0537	0590	0642	0695̄	0748	0800	
43	0853	0906	0958	1011	1064	1116	1169	1222	1274	1327	
44	1380	1433	1485	1538	1591	1643	1696	1749	1801	1854	
45	1907	1959	2012	2065̄	2117	2170	2223	2275	2328	2381	
46	2433	2486	2539	2591	2644	2697	2749	2802	2855̄	2907	
47	2960	3013	3065	3118	3171	3223	3276	3329	3381	3434	
48	3487	3539	3592	3644	3697	3750	3802	3855	3908	3960	
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58	8749	8801	8854	8907	8959	9012	9064	9117	9169	9222	
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62	0852	0904	0957	1010	1062	1115̄	1167	1220	1272	1325̄	
63	1378	1430	1483	1535	1588	1640	1693	1745	1798	1851	
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65	2429	2481	2534	2586	2639	2691	2744	2796	2849	2901	
66	2954	3007	3059	3112	3164	3217	3269	3322	3374	3427	
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69	4530	4582	4635̄	4687	4740	4793	4845	4898	4950	5003	
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71	5580	5633	5685	5738	5790	5843	5895	5948	6000	6053	
72	6105	6158	6210	6263	6315	6368	6420	6473	6525	6578	
73	6630	6683	6735	6788	6840	6893	6945	6998	7050	7103	
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76	8205̄	8257	8310	8362	8415̄	8467	8520	8572	8625̄	8677	
77	8730	8782	8834	8887	8939	8992	9044	9097	9149	9202	
78	9254	9307	9359	9412	9464	9517	9569	9621	9674	9726	
79	9779	9831	9884	9936	9989	0̄041	0̄094	0̄146	0̄198	0̄251	
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91	6069	6122	6174	6226	6279	6331	6383	6436	6488	6541	
92	6593	6645	6698	6750	6802	6855̄	6907	6960	7012	7064	
93	7117	7169	7221	7274	7326	7378	7431	7483	7536	7588	
94	7640	7693	7745	7797	7850	7902	7954	8007	8059	8112	
95	8164	8216	8269	8321	8373	8426	8478	8530	8583	8635	
96	8687	8740	8792	8844	8897	8949	9002	9054	9106	9159	
97	9211	9263	9316	9368	9420	9473	9525̄	9577	9630	9682	
98	9734	9787	9839	9891	9944	9996	0̄048	0̄101	0̄153	0̄205	
99	919 0258	0310	0362	0415̄	0467	0519	0572	0624	0676	0729	
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07	4442	4494	4547	4599	4651	4703	4756	4808	4860	4913
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09	5488	5540	5592	5644	5697	5749	5801	5853	5906	5958
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12	7055	7108	7160	7212	7264	7317	7369	7421	7473	7526
13	7578	7630	7682	7735	7787	7839	7891	7943	7996	8048
14	8100	8152	8205	8257	8309	8361	8414	8466	8518	8570
15	8623	8675	8727	8779	8831	8884	8936	8988	9040	9093
16	9145	9197	9249	9301	9354	9406	9458	9510	9563	9615
17	9667	9719	9771	9824	9876	9928	9980	0033	0085	0137
18	920 0189	0241	0294	0346	0398	0450	0502	0555	0607	0659
19	0711	0763	0816	0868	0920	0972	1024	1077	1129	1181
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21	1755	1807	1860	1912	1964	2016	2068	2121	2173	2225
22	2277	2329	2381	2434	2486	2538	2590	2642	2695	2747
23	2799	2851	2903	2955	3008	3060	3112	3164	3216	3269
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25	3842	3895	3947	3999	4051	4103	4155	4208	4260	4312
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27	4886	4938	4990	5042	5094	5146	5199	5251	5303	5355
28	5407	5459	5511	5564	5616	5668	5720	5772	5824	5876
29	5929	5981	6033	6085	6137	6189	6241	6294	6346	6398
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32	7493	7545	7597	7649	7701	7753	7805	7857	7910	7962
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34	8535	8587	8639	8691	8743	8796	8848	8900	8952	9004
35	9056	9108	9160	9212	9264	9317	9369	9421	9473	9525
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37	921 0098	0150	0202	0254	0306	0358	0411	0463	0515	0567
38	0619	0671	0723	0775	0827	0879	0931	0983	1036	1088
39	1140	1192	1244	1296	1348	1400	1452	1504	1556	1608
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41	2181	2233	2285	2337	2389	2442	2494	2546	2598	2650
42	2702	2754	2806	2858	2910	2962	3014	3066	3118	3170
43	3222	3274	3327	3379	3431	3483	3535	3587	3639	3691
44	3743	3795	3847	3899	3951	4003	4055	4107	4159	4211
45	4263	4315	4367	4420	4472	4524	4576	4628	4680	4732
46	4784	4836	4888	4940	4992	5044	5096	5148	5200	5252
47	5304	5356	5408	5460	5512	5564	5616	5668	5720	5772
48	5824	5876	5928	5980	6032	6085	6137	6189	6241	6293
49	6345	6397	6449	6501	6553	6605	6657	6709	6761	6813
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53	8425	8477	8529	8581	8633	8685	8737	8789	8841	8893	
54	8945	8997	9049	9101	9153	9205	9257	9309	9361	9413	
55	9465	9517	9569	9620	9672	9724	9776	9828	9880	9932	
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59	1543	1595	1647	1699	1751	1803	1855	1907	1959	2011	
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62	3102	3154	3206	3257	3309	3361	3413	3465	3517	3569	
63	3621	3673	3725	3777	3829	3881	3933	3984	4036	4088	
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68	6217	6269	6321	6372	6424	6476	6528	6580	6632	6684	
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82	3477	3528	3580	3632	3684	3736	3787	3839	3891	3943	
83	3995	4046	4098	4150	4202	4254	4305	4357	4409	4461	
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95	924 0207	0259	0310	0362	0414	0466	0517	0569	0621	0673	
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97	1242	1293	1345	1397	1448	1500	1552	1604	1655	1707	
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22	4152	4204	4256	4307	4359	4410	4462	4513	4565	4616	
23	4668	4720	4771	4823	4874	4926	4977	5029	5080	5132	
24	5184	5235	5287	5338	5390	5441	5493	5544	5596	5648	
25	5699	5751	5802	5854	5905	5957	6008	6060	6111	6163	
26	6215	6266	6318	6369	6421	6472	6524	6575	6627	6678	
27	6730	6781	6833	6885	6936	6988	7039	7091	7142	7194	
28	7245	7297	7348	7400	7451	7503	7554	7606	7657	7709	
29	7761	7812	7864	7915	7967	8018	8070	8121	8173	8224	
8430	8276	8327	8379	8430	8482	8533	8585	8636	8688	8739	
31	8791	8842	8894	8945	8997	9048	9100	9151	9203	9254	51
32	9306	9357	9409	9460	9512	9563	9615	9667	9718	9770	1 5.1
33	9821	9873	9924	9975	0̄027	0̄078	0̄130	0̄181	0̄233	0̄284	2 10.2
34	926 0336	0387	0439	0490	0542	0593	0645	0696	0748	0799	3 15.3 4 20.4
35	0851	0902	0954	1005	1057	1108	1160	1211	1263	1314	5 25.5
36	1366	1417	1469	1520	1572	1623	1675	1726	1778	1829	6 30.6
37	1880	1932	1983	2035	2086	2138	2189	2241	2292	2344	7 35.7
38	2395	2447	2498	2550	2601	2653	2704	2755	2807	2858	8 40.8
39	2910	2961	3013	3064	3116	3167	3219	3270	3322	3373	9 45.9
8440	3424	3476	3527	3579	3630	3682	3733	3785	3836	3888	
41	3939	3990	4042	4093	4145	4196	4248	4299	4351	4402	
42	4453	4505	4556	4608	4659	4711	4762	4814	4865	4916	
43	4968	5019	5071	5122	5174	5225	5277	5328	5379	5431	
44	5482	5534	5585	5637	5688	5739	5791	5842	5894	5945	
45	5997	6048	6099	6151	6202	6254	6305	6357	6408	6459	
46	6511	6562	6614	6665	6716	6768	6819	6871	6922	6974	
47	7025	7076	7128	7179	7231	7282	7333	7385	7436	7488	
48	7539	7590	7642	7693	7745	7796	7847	7899	7950	8002	
49	8053	8105	8156	8207	8259	8310	8362	8413	8464	8516	
8450	8567	8618	8670	8721	8773	8824	8875	8927	8978	9030	
N.	0	1	2	3	4	5	6	7	8	9	P. P.

8450 — 8500

N.	0	1	2	3	4	5	6	7	8	9
8450	926 8567	8618	8670	8721	8773	8824	8875	8927	8978	9030
51	9081	9132	9184	9235	9287	9338	9389	9441	9492	9543
52	9595̄	9646	9698	9749	9800	9852	9903	9955̄	0̄006	0̄057
53	927 0109	0160	0211	0263	0314	0366	0417	0468	0520	0571
54	0622	0674	0725	0777	0828	0879	0931	0982	1033	1085̄
55	1136	1187	1239	1290	1342	1393	1444	1496	1547	1598
56	1650	1701	1752	1804	1855	1907	1958	2009	2061	2112
57	2163	2215̄	2266	2317	2369	2420	2471	2523	2574	2625
58	2677	2728	2780	2831	2882	2934	2985̄	3036	3088	3139
59	3190	3242	3293	3344	3396	3447	3498	3550	3601	3652
8460	3704	3755̄	3806	3858	3909	3960	4012	4063	4114	4166
61	4217	4268	4320	4371	4422	4474	4525̄	4576	4628	4679
62	4730	4782	4833	4884	4935	4987	5038	5089	5141	5192
63	5243	5295̄	5346	5397	5449	5500	5551	5603	5654	5705
64	5757	5808	5859	5910	5962	6013	6064	6116	6167	6218
65	6270	6321	6372	6424	6475̄	6526	6577	6629	6680	6731
66	6783	6834	6885	6937	6988	7039	7090	7142	7193	7244
67	7296	7347	7398	7449	7501	7552	7603	7655̄	7706	7757
68	7808	7860	7911	7962	8014	8065̄	8116	8167	8219	8270
69	8321	8373	8424	8475	8526	8578	8629	8680	8732	8783
8470	8834	8885	8937	8988	9039	9090	9142	9193	9244	9296
71	9347	9398	9449	9501	9552	9603	9654	9706	9757	9808
72	9859	9911	9962	0̄013	0̄065̄	0̄116	0̄167	0̄218	0̄270	0̄321
73	928 0372	0423	0475̄	0526	0577	0628	0680	0731	0782	0833
74	0885̄	0936	0987	1038	1090	1141	1192	1243	1295̄	1346
75	1397	1448	1500	1551	1602	1653	1705̄	1756	1807	1858
76	1909	1961	2012	2063	2114	2166	2217	2268	2319	2371
77	2422	2473	2524	2576	2627	2678	2729	2780	2832	2883
78	2934	2985	3037	3088	3139	3190	3241	3293	3344	3395
79	3446	3498	3549	3600	3651	3702	3754	3805̄	3856	3907
8480	3959	4010	4061	4112	4163	4215̄	4266	4317	4368	4419
81	4471	4522	4573	4624	4675	4727	4778	4829	4880	4931
82	4983	5034	5085	5136	5187	5239	5290	5341	5392	5443
83	5495̄	5546	5597	5648	5699	5751	5802	5853	5904	5955
84	6007	6058	6109	6160	6211	6263	6314	6365̄	6416	6467
85	6518	6570	6621	6672	6723	6774	6826	6877	6928	6979
86	7030	7081	7133	7184	7235̄	7286	7337	7389	7440	7491
87	7542	7593	7644	7696	7747	7798	7849	7900	7951	8003
88	8054	8105̄	8156	8207	8258	8310	8361	8412	8463	8514
89	8565	8616	8668	8719	8770	8821	8872	8923	8975̄	9026
8490	9077	9128	9179	9230	9282	9333	9384	9435̄	9486	9537
91	9588	9640	9691	9742	9793	9844	9895	9946	9998	0̄049
92	929 0100	0151	0202	0253	0304	0356	0407	0458	0509	0560
93	0611	0662	0714	0765̄	0816	0867	0918	0969	1020	1071
94	1123	1174	1225̄	1276	1327	1378	1429	1480	1532	1583
95	1634	1685̄	1736	1787	1838	1889	1941	1992	2043	2094
96	2145	2196	2247	2298	2350	2401	2452	2503	2554	2605
97	2656	2707	2758	2810	2861	2912	2963	3014	3065	3116
98	3167	3218	3269	3321	3372	3423	3474	3525̄	3576	3627
99	3678	3729	3780	3832	3883	3934	3985̄	4036	4087	4138
8500	4189	4240	4291	4343	4394	4445̄	4496	4547	4598	4649
N.	0	1	2	3	4	5	6	7	8	9

P. P.

	52
1	5.2
2	10.4
3	15.6
4	20.8
5	26.0
6	31.2
7	36.4
8	41.6
9	46.8

	51
1	5.1
2	10.2
3	15.3
4	20.4
5	25.5
6	30.6
7	35.7
8	40.8
9	45.9

P. P.

N.	0	1	2	3	4	5	6	7	8	9	P. P.
8500	929 4189	4240	4291	4343	4394	4445̄	4496	4547	4598	4649	
01	4700	4751	4802	4853	4905̄	4956	5007	5058	5109	5160	
02	5211	5262	5313	5364	5415	5466	5517	5569	5620	5671	
03	5722	5773	5824	5875	5926	5977	6028	6079	6130	6181	
04	6233	6284	6335̄	6386	6437	6488	6539	6590	6641	6692	
05	6743	6794	6845	6896	6947	6998	7050	7101	7152	7203	
06	7254	7305̄	7356	7407	7458	7509	7560	7611	7662	7713	
07	7764	7815	7866	7917	7969	8020	8071	8122	8173	8224	
08	8275̄	8326	8377	8428	8479	8530	8581	8632	8683	8734	
09	8785	8836	8887	8938	8989	9040	9091	9142	9194	9245̄	
8510	9296	9347	9398	9449	9500	9551	9602	9653	9704	9755̄	
11	9806	9857	9908	9959	0̄010	0̄061	0̄112	0̄163	0̄214	0̄265	52
12	930 0316	0367	0418	0469	0520	0571	0622	0673	0724	0775	1 5.2
13	0826	0877	0928	0979	1030	1081	1132	1183	1234	1285	2 10.4
14	1336	1387	1438	1489	1540	1591	1643	1694	1745̄	1796	3 15.6
15	1847	1898	1949	2000	2051	2102	2153	2204	2255̄	2306	4 20.8
16	2357	2408	2459	2510	2561	2612	2663	2713	2764	2815	5 26.0
17	2866	2917	2968	3019	3070	3121	3172	3223	3274	3325	6 31.2
18	3376	3427	3478	3529	3580	3631	3682	3733	3784	3835	7 36.4
19	3886	3937	3988	4039	4090	4141	4192	4243	4294	4345̄	8 41.6
8520	4396	4447	4498	4549	4600	4651	4702	4753	4804	4855̄	9 46.8
21	4906	4957	5008	5059	5110	5160	5211	5262	5313	5364	
22	5415	5466	5517	5568	5619	5670	5721	5772	5823	5874	
23	5925̄	5976	6027	6078	6129	6180	6231	6282	6333	6383	
24	6434	6485	6536	6587	6638	6689	6740	6791	6842	6893	
25	6944	6995̄	7046	7097	7148	7199	7250	7300	7351	7402	
26	7453	7504	7555	7606	7657	7708	7759	7810	7861	7912	
27	7963	8014	8064	8115	8166	8217	8268	8319	8370	8421	
28	8472	8523	8574	8625̄	8676	8727	8777	8828	8879	8930	
29	8981	9032	9083	9134	9185̄	9236	9287	9338	9388	9439	
8530	9490	9541	9592	9643	9694	9745̄	9796	9847	9898	9949	
31	9999	0̄050	0̄101	0̄152	0̄203	0̄254	0̄305̄	0̄356	0̄407	0̄458	51
32	931 0508	0559	0610	0661	0712	0763	0814	0865̄	0916	0967	1 5.1
33	1017	1068	1119	1170	1221	1272	1323	1374	1425̄	1475	2 10.2
34	1526	1577	1628	1679	1730	1781	1832	1883	1933	1984	3 15.3
35	2035	2086	2137	2188	2239	2290	2341	2391	2442	2493	4 20.4
36	2544	2595̄	2646	2697	2748	2798	2849	2900	2951	3002	5 25.5
37	3053	3104	3155̄	3205	3256	3307	3358	3409	3460	3511	6 30.6
38	3562	3612	3663	3714	3765̄	3816	3867	3918	3968	4019	7 35.7
39	4070	4121	4172	4223	4274	4324	4375	4426	4477	4528	8 40.8
8540	4579	4630	4680	4731	4782	4833	4884	4935̄	4986	5036	9 45.9
41	5087	5138	5189	5240	5291	5341	5392	5443	5494	5545̄	
42	5596	5647	5697	5748	5799	5850	5901	5952	6002	6053	
43	6104	6155̄	6206	6257	6307	6358	6409	6460	6511	6562	
44	6612	6663	6714	6765̄	6816	6867	6917	6968	7019	7070	
45	7121	7171	7222	7273	7324	7375̄	7426	7476	7527	7578	
46	7629	7680	7731	7781	7832	7883	7934	7985̄	8035	8086	
47	8137	8188	8239	8289	8340	8391	8442	8493	8544	8594	
48	8645	8696	8747	8798	8848	8899	8950	9001	9052	9102	
49	9153	9204	9255̄	9306	9356	9407	9458	9509	9560	9610	
8550	9661	9712	9763	9814	9864	9915	9966	0̄017	0̄067	0̄118	
N.	0	1	2	3	4	5	6	7	8	9	P. P.

8550 — 8600

N.	0	1	2	3	4	5	6	7	8	9	P. P.
8550	931 9661	9712	9763	9814	9864	9915	9966	0̄017	0̄067	0̄118	
51	932 0169	0220	0271	0321	0372	0423	0474	0525̄	0575	0626	
52	0677	0728	0778	0829	0880	0931	0982	1032	1083	1134	
53	1185̄	1235	1286	1337	1388	1439	1489	1540	1591	1642	
54	1692	1743	1794	1845̄	1896	1946	1997	2048	2099	2149	
55	2200	2251	2302	2352	2403	2454	2505̄	2555	2606	2657	
56	2708	2759	2809	2860	2911	2962	3012	3063	3114	3165̄	
57	3215	3266	3317	3368	3418	3469	3520	3571	3621	3672	
58	3723	3774	3824	3875	3926	3977	4027	4078	4129	4180	
59	4230	4281	4332	4382	4433	4484	4535̄	4585	4636	4687	
8560	4738	4788	4839	4890	4941	4991	5042	5093	5144	5194	
61	5245̄	5296	5346	5397	5448	5499	5549	5600	5651	5702	51 1 5.1 2 10.2 3 15.3 4 20.4 5 25.5 6 30.6 7 35.7 8 40.8 9 45.9
62	5752	5803	5854	5904	5955	6006	6057	6107	6158	6209	
63	6259	6310	6361	6412	6462	6513	6564	6614	6665	6716	
64	6767	6817	6868	6919	6969	7020	7071	7122	7172	7223	
65	7274	7324	7375	7426	7476	7527	7578	7629	7679	7730	
66	7781	7831	7882	7933	7983	8034	8085̄	8136	8186	8237	
67	8288	8338	8389	8440	8490	8541	8592	8643	8693	8744	
68	8795̄	8845	8896	8947	8997	9048	9099	9149	9200	9251	
69	9301	9352	9403	9453	9504	9555̄	9606	9656	9707	9758	
8570	9808	9859	9910	9960	0̄011	0̄062	0̄112	0̄163	0̄214	0̄264	
71	933 0315̄	0366	0416	0467	0518	0568	0619	0670	0720	0771	
72	0822	0872	0923	0974	1024	1075̄	1126	1176	1227	1278	
73	1328	1379	1430	1480	1531	1582	1632	1683	1733	1784	
74	1835̄	1885	1936	1987	2037	2088	2139	2189	2240	2291	
75	2341	2392	2443	2493	2544	2595̄	2645	2696	2746	2797	
76	2848	2898	2949	3000	3050	3101	3152	3202	3253	3303	
77	3354	3405̄	3455	3506	3557	3607	3658	3709	3759	3810	
78	3860	3911	3962	4012	4063	4114	4164	4215̄	4265	4316	
79	4367	4417	4468	4519	4569	4620	4670	4721	4772	4822	
8580	4873	4923	4974	5025̄	5075	5126	5177	5227	5278	5328	
81	5379	5430	5480	5531	5581	5632	5683	5733	5784	5834	50 1 5.0 2 10.0 3 15.0 4 20.0 5 25.0 6 30.0 7 35.0 8 40.0 9 45.0
82	5885	5936	5986	6037	6088	6138	6189	6239	6290	6341	
83	6391	6442	6492	6543	6594	6644	6695̄	6745	6796	6846	
84	6897	6948	6998	7049	7099	7150	7201	7251	7302	7352	
85	7403	7454	7504	7555̄	7605	7656	7707	7757	7808	7858	
86	7909	7959	8010	8061	8111	8162	8212	8263	8313	8364	
87	8415̄	8465	8516	8566	8617	8668	8718	8769	8819	8870	
88	8920	8971	9021	9072	9123	9173	9224	9274	9325̄	9375	
89	9426	9477	9527	9578	9628	9679	9729	9780	9831	9881	
8590	9932	9982	0̄033	0̄083	0̄134	0̄184	0̄235̄	0̄286	0̄336	0̄387	
91	934 0437	0488	0538	0589	0639	0690	0740	0791	0842	0892	
92	0943	0993	1044	1094	1145̄	1195	1246	1296	1347	1398	
93	1448	1499	1549	1600	1650	1701	1751	1802	1852	1903	
94	1953	2004	2055̄	2105	2156	2206	2257	2307	2358	2408	
95	2459	2509	2560	2610	2661	2711	2762	2812	2863	2914	
96	2964	3015̄	3065	3116	3166	3217	3267	3318	3368	3419	
97	3469	3520	3570	3621	3671	3722	3772	3823	3873	3924	
98	3974	4025̄	4075	4126	4176	4227	4277	4328	4378	4429	
99	4479	4530	4580	4631	4682	4732	4783	4833	4884	4934	
8600	4985̄	5035	5086	5136	5187	5237	5287	5338	5388	5439	
N.	0	1	2	3	4	5	6	7	8	9	P. P.

N.	0	1	2	3	4	5	6	7	8	9
8600	934 4985̄	5035	5086	5136	5187	5237	5287	5338	5388	5439
01	5489	5540	5590	5641	5691	5742	5792	5843	5893	5944
02	5994	6045̄	6095	6146	6196	6247	6297	6348	6398	6449
03	6499	6550	6600	6651	6701	6752	6802	6853	6903	6954
04	7004	7054	7105̄	7155	7206	7256	7307	7357	7408	7458
05	7509	7559	7610	7660	7711	7761	7812	7862	7912	7963
06	8013	8064	8114	8165̄	8215	8266	8316	8367	8417	8468
07	8518	8568	8619	8669	8720	8770	8821	8871	8922	8972
08	9023	9073	9123	9174	9224	9275̄	9325	9376	9426	9477
09	9527	9578	9628	9678	9729	9779	9830	9880	9931	9981
8610	935 0032	0082	0132	0183	0233	0284	0334	0385̄	0435	0485
11	0536	0586	0637	0687	0738	0788	0838	0889	0939	0990
12	1040	1091	1141	1191	1242	1292	1343	1393	1444	1494
13	1544	1595̄	1645	1696	1746	1797	1847	1897	1948	1998
14	2049	2099	2150	2200	2250	2301	2351	2402	2452	2502
15	2553	2603	2654	2704	2754	2805̄	2855	2906	2956	3006
16	3057	3107	3158	3208	3259	3309	3359	3410	3460	3511
17	3561	3611	3662	3712	3763	3813	3863	3914	3964	4015̄
18	4065̄	4115	4166	4216	4266	4317	4367	4418	4468	4518
19	4569	4619	4670	4720	4770	4821	4871	4922	4972	5022
8620	5073	5123	5173	5224	5274	5325̄	5375̄	5425	5476	5526
21	5576	5627	5677	5728	5778	5828	5879	5929	5979	6030
22	6080	6131	6181	6231	6282	6332	6382	6433	6483	6533
23	6584	6634	6685̄	6735̄	6785	6836	6886	6936	6987	7037
24	7087	7138	7188	7239	7289	7339	7390	7440	7490	7541
25	7591	7641	7692	7742	7792	7843	7893	7943	7994	8044
26	8095̄	8145̄	8195	8246	8296	8346	8397	8447	8497	8548
27	8598	8648	8699	8749	8799	8850	8900	8950	9001	9051
28	9101	9152	9202	9252	9303	9353	9403	9454	9504	9554
29	9605̄	9655	9705	9756	9806	9856	9907	9957	0̄007	0̄058
8630	936 0108	0158	0209	0259	0309	0360	0410	0460	0511	0561
31	0611	0661	0712	0762	0812	0863	0913	0963	1014	1064
32	1114	1165̄	1215̄	1265	1316	1366	1416	1466	1517	1567
33	1617	1668	1718	1768	1819	1869	1919	1970	2020	2070
34	2120	2171	2221	2271	2322	2372	2422	2473	2523	2573
35	2623	2674	2724	2774	2825̄	2875̄	2925	2975	3026	3076
36	3126	3177	3227	3277	3327	3378	3428	3478	3529	3579
37	3629	3679	3730	3780	3830	3881	3931	3981	4031	4082
38	4132	4182	4233	4283	4333	4383	4434	4484	4534	4584
39	4635̄	4685	4735	4786	4836	4886	4936	4987	5037	5087
8640	5137	5188	5238	5288	5338	5389	5439	5489	5540	5590
41	5640	5690	5741	5791	5841	5891	5942	5992	6042	6092
42	6143	6193	6243	6293	6344	6394	6444	6494	6545̄	6595̄
43	6645	6695	6746	6796	6846	6896	6947	6997	7047	7097
44	7148	7198	7248	7298	7349	7399	7449	7499	7550	7600
45	7650	7700	7750	7801	7851	7901	7951	8002	8052	8102
46	8152	8203	8253	8303	8353	8403	8454	8504	8554	8604
47	8655̄	8705̄	8755	8805	8855	8906	8956	9006	9056	9107
48	9157	9207	9257	9307	9358	9408	9458	9508	9559	9609
49	9659	9709	9759	9810	9860	9910	9960	0̄010	0̄061	0̄111
8650	937 0161	0211	0261	0312	0362	0412	0462	0513	0563	0613
N.	0	1	2	3	4	5	6	7	8	9

P. P.

	51
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7	35.7
8	40.8
9	45.9

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8	40.0
9	45.0

P. P.

N.	0	1	2	3	4	5	6	7	8	9
8650	937 0161	0211	0261	0312	0362	0412	0462	0513	0563	0613
51	0663	0713	0764	0814	0864	0914	0964	1015̄	1065̄	1115̄
52	1165	1215	1265	1316	1366	1416	1466	1516	1567	1617
53	1667	1717	1767	1818	1868	1918	1968	2018	2069	2119
54	2169	2219	2269	2319	2370	2420	2470	2520	2570	2621
55	2671	2721	2771	2821	2871	2922	2972	3022	3072	3122
56	3172	3223	3273	3323	3373	3423	3474	3524	3574	3624
57	3674	3724	3775̄	3825̄	3875̄	3925	3975	4025	4075	4126
58	4176	4226	4276	4326	4376	4427	4477	4527	4577	4627
59	4677	4728	4778	4828	4878	4928	4978	5028	5079	5129
8660	5179	5229	5279	5329	5380	5430	5480	5530	5580	5630
61	5680	5731	5781	5831	5881	5931	5981	6031	6082	6132
62	6182	6232	6282	6332	6382	6432	6483	6533	6583	6633
63	6683	6733	6783	6834	6884	6934	6984	7034	7084	7134
64	7184	7235̄	7285̄	7335̄	7385̄	7435	7485	7535	7585	7636
65	7686	7736	7786	7836	7886	7936	7986	8037	8087	8137
66	8187	8237	8287	8337	8387	8437	8488	8538	8588	8638
67	8688	8738	8788	8838	8888	8939	8989	9039	9089	9139
68	9189	9239	9289	9339	9389	9440	9490	9540	9590	9640
69	9690	9740	9790	9840	9890	9941	9991	0̄041	0̄091	0̄141
8670	938 0191	0241	0291	0341	0391	0441	0492	0542	0592	0642
71	0692	0742	0792	0842	0892	0942	0992	1042	1093	1143
72	1193	1243	1293	1343	1393	1443	1493	1543	1593	1643
73	1693	1744	1794	1844	1894	1944	1994	2044	2094	2144
74	2194	2244	2294	2344	2394	2445̄	2495̄	2545̄	2595̄	2645̄
75	2695̄	2745̄	2795̄	2845	2895	2945	2995	3045	3095	3145
76	3195	3245	3296	3346	3396	3446	3496	3546	3596	3646
77	3696	3746	3796	3846	3896	3946	3996	4046	4096	4146
78	4196	4247	4297	4347	4397	4447	4497	4547	4597	4647
79	4697	4747	4797	4847	4897	4947	4997	5047	5097	5147
8680	5197	5247	5297	5347	5397	5447	5497	5547	5598	5648
81	5698	5748	5798	5848	5898	5948	5998	6048	6098	6148
82	6198	6248	6298	6348	6398	6448	6498	6548	6598	6648
83	6698	6748	6798	6848	6898	6948	6998	7048	7098	7148
84	7198	7248	7298	7348	7398	7448	7498	7548	7598	7648
85	7698	7748	7798	7848	7898	7948	7998	8048	8098	8148
86	8198	8248	8298	8348	8398	8448	8498	8548	8598	8648
87	8698	8748	8798	8848	8898	8948	8998	9048	9098	9148
88	9198	9248	9298	9348	9398	9448	9498	9548	9598	9648
89	9698	9748	9798	9848	9898	9948	9998	0̄048	0̄098	0̄148
8690	939 0198	0248	0298	0348	0398	0448	0498	0548	0598	0648
91	0697	0747	0797	0847	0897	0947	0997	1047	1097	1147
92	1197	1247	1297	1347	1397	1447	1497	1547	1597	1647
93	1697	1747	1797	1847	1897	1947	1997	2046	2096	2146
94	2196	2246	2296	2346	2396	2446	2496	2546	2596	2646
95	2696	2746	2796	2846	2896	2946	2996	3045	3095	3145
96	3195	3245	3295	3345	3395	3445	3495̄	3545̄	3595̄	3645̄
97	3695̄	3745̄	3795̄	3845̄	3894	3944	3994	4044	4094	4144
98	4194	4244	4294	4344	4394	4444	4494	4544	4593	4643
99	4693	4743	4793	4843	4893	4943	4993	5043	5093	5143
8700	5193	5242	5292	5342	5392	5442	5492	5542	5592	5642
N.	0	1	2	3	4	5	6	7	8	9

P. P.

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4	19.6
5	24.5
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7	34.3
8	39.2
9	44.1

P. P.

8700 — 8750

N.	0	1	2	3	4	5	6	7	8	9	P. P.
8700	939 5193	5242	5292	5342	5392	5442	5492	5542	5592	5642	
01	5692	5742	5792	5841	5891	5941	5991	6041	6091	6141	
02	6191	6241	6291	6341	6390	6440	6490	6540	6590	6640	
03	6690	6740	6790	6840	6889	6939	6989	7039	7089	7139	
04	7189	7239	7289	7339	7388	7438	7488	7538	7588	7638	
05	7688	7738	7788	7837	7887	7937	7987	8037	8087	8137	
06	8187	8237	8286	8336	8386	8436	8486	8536	8586	8636	
07	8685	8735	8785	8835	8885̄	8935̄	8985̄	9035̄	9084	9134	
08	9184	9234	9284	9334	9384	9434	9483	9533	9583	9633	
09	9683	9733	9783	9833	9882	9932	9982	0̄032	0̄082	0̄132	
8710	940 0182	0231	0281	0331	0381	0431	0481	0531	0580	0630	
11	0680	0730	0780	0830	0880	0929	0979	1029	1079	1129	50 1 5.0 2 10.0 3 15.0 4 20.0 5 25.0 6 30.0 7 35.0 8 40.0 9 45.0
12	1179	1229	1278	1328	1378	1428	1478	1528	1577	1627	
13	1677	1727	1777	1827	1877	1926	1976	2026	2076	2126	
14	2176	2225	2275	2325	2375̄	2425̄	2475̄	2524	2574	2624	
15	2674	2724	2774	2823	2873	2923	2973	3023	3073	3122	
16	3172	3222	3272	3322	3372	3421	3471	3521	3571	3621	
17	3670	3720	3770	3820	3870	3920	3969	4019	4069	4119	
18	4169	4218	4268	4318	4368	4418	4468	4517	4567	4617	
19	4667	4717	4766	4816	4866	4916	4966	5015	5065	5115	
8720	5165̄	5215̄	5264	5314	5364	5414	5464	5513	5563	5613	
21	5663	5713	5762	5812	5862	5912	5962	6011	6061	6111	
22	6161	6211	6260	6310	6360	6410	6460	6509	6559	6609	
23	6659	6709	6758	6808	6858	6908	6957	7007	7057	7107	
24	7157	7206	7256	7306	7356	7405	7455	7505	7555̄	7605̄	
25	7654	7704	7754	7804	7853	7903	7953	8003	8053	8102	
26	8152	8202	8252	8301	8351	8401	8451	8500	8550	8600	
27	8650	8700	8749	8799	8849	8899	8948	8998	9048	9098	
28	9147	9197	9247	9297	9346	9396	9446	9496	9545	9595	
29	9645̄	9695̄	9744	9794	9844	9894	9943	9993	0̄043	0̄093	
8730	941 0142	0192	0242	0292	0341	0391	0441	0491	0540	0590	
31	0640	0690	0739	0789	0839	0889	0938	0988	1038	1088	49 1 4.9 2 9.8 3 14.7 4 19.6 5 24.5 6 29.4 7 34.3 8 39.2 9 44.1
32	1137	1187	1237	1286	1336	1386	1436	1485	1535	1585̄	
33	1635̄	1684	1734	1784	1834	1883	1933	1983	2032	2082	
34	2132	2182	2231	2281	2331	2380	2430	2480	2530	2579	
35	2629	2679	2729	2778	2828	2878	2927	2977	3027	3077	
36	3126	3176	3226	3275	3325	3375̄	3425̄	3474	3524	3574	
37	3623	3673	3723	3772	3822	3872	3922	3971	4021	4071	
38	4120	4170	4220	4270	4319	4369	4419	4468	4518	4568	
39	4617	4667	4717	4766	4816	4866	4916	4965	5015̄	5065̄	
8740	5114	5164	5214	5263	5313	5363	5412	5462	5512	5562	
41	5611	5661	5711	5760	5810	5860	5909	5959	6009	6058	
42	6108	6158	6207	6257	6307	6356	6406	6456	6505	6555	
43	6605̄	6654	6704	6754	6803	6853	6903	6952	7002	7052	
44	7101	7151	7201	7250	7300	7350	7399	7449	7499	7548	
45	7598	7648	7697	7747	7797	7846	7896	7946	7995	8045	
46	8095̄	8144	8194	8244	8293	8343	8393	8442	8492	8542	
47	8591	8641	8691	8740	8790	8840	8889	8939	8988	9038	
48	9088	9137	9187	9237	9286	9336	9386	9435	9485̄	9535̄	
49	9584	9634	9683	9733	9783	9832	9882	9932	9981	0̄031	
8750	942 0081	0130	0180	0229	0279	0329	0378	0428	0478	0527	
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8750	942 0081	0130	0180	0229	0279	0329	0378	0428	0478	0527	
51	0577	0626	0676	0726	0775	0825̄	0875̄	0924	0974	1023	
52	1073	1123	1172	1222	1272	1321	1371	1420	1470	1520	
53	1569	1619	1669	1718	1768	1817	1867	1917	1966	2016	
54	2065	2115	2165̄	2214	2264	2313	2363	2413	2462	2512	
55	2562	2611	2661	2710	2760	2810	2859	2909	2958	3008	
56	3058	3107	3157	3206	3256	3306	3355	3405̄	3454	3504	
57	3553	3603	3653	3702	3752	3801	3851	3901	3950	4000	
58	4049	4099	4149	4198	4248	4297	4347	4397	4446	4496	
59	4545	4595̄	4644	4694	4744	4793	4843	4892	4942	4991	
8760	5041	5091	5140	5190	5239	5289	5339	5388	5438	5487	
61	5537	5586	5636	5686	5735	5785̄	5834	5884	5933	5983	50 1 5.0 2 10.0 3 15.0 4 20.0 5 25.0 6 30.0 7 35.0 8 40.0 9 45.0
62	6032	6082	6132	6181	6231	6280	6330	6379	6429	6479	
63	6528	6578	6627	6677	6726	6776	6825	6875	6925̄	6974	
64	7024	7073	7123	7172	7222	7271	7321	7371	7420	7470	
65	7519	7569	7618	7668	7717	7767	7816	7866	7916	7965	
66	8015̄	8064	8114	8163	8213	8262	8312	8361	8411	8461	
67	8510	8560	8609	8659	8708	8758	8807	8857	8906	8956	
68	9005	9055̄	9104	9154	9204	9253	9303	9352	9402	9451	
69	9501	9550	9600	9649	9699	9748	9798	9847	9897	9946	
8770	9996	0̄045	0̄095̄	0̄144	0̄194	0̄244	0̄293	0̄343	0̄392	0̄442	
71	943 0491	0541	0590	0640	0689	0739	0788	0838	0887	0937	
72	0986	1036	1085	1135̄	1184	1234	1283	1333	1382	1432	
73	1481	1531	1580	1630	1679	1729	1778	1828	1877	1927	
74	1976	2026	2075	2125̄	2174	2224	2273	2323	2372	2422	
75	2471	2521	2570	2620	2669	2719	2768	2818	2867	2917	
76	2966	3016	3065	3115̄	3164	3214	3263	3313	3362	3412	
77	3461	3510	3560	3609	3659	3708	3758	3807	3857	3906	
78	3956	4005	4055̄	4104	4154	4203	4253	4302	4352	4401	
79	4450	4500	4549	4599	4648	4698	4747	4797	4846	4896	
8780	4945	4995̄	5044	5094	5143	5192	5242	5291	5341	5390	
81	5440	5489	5539	5588	5638	5687	5737	5786	5835	5885̄	49 1 4.9 2 9.8 3 14.7 4 19.6 5 24.5 6 29.4 7 34.3 8 39.2 9 44.1
82	5934	5984	6033	6083	6132	6182	6231	6280	6330	6379	
83	6429	6478	6528	6577	6627	6676	6726	6775̄	6824	6874	
84	6923	6973	7022	7072	7121	7170	7220	7269	7319	7368	
85	7418	7467	7517	7566	7615	7665̄	7714	7764	7813	7863	
86	7912	7961	8011	8060	8110	8159	8209	8258	8307	8357	
87	8406	8456	8505	8555̄	8604	8653	8703	8752	8802	8851	
88	8900	8950	8999	9049	9098	9148	9197	9246	9296	9345	
89	9395̄	9444	9493	9543	9592	9642	9691	9741	9790	9839	
8790	9889	9938	9988	0̄037	0̄086	0̄136	0̄185	0̄235̄	0̄284	0̄333	
91	944 0383	0432	0482	0531	0580	0630	0679	0729	0778	0827	
92	0877	0926	0976	1025̄	1074	1124	1173	1223	1272	1321	
93	1371	1420	1470	1519	1568	1618	1667	1716	1766	1815	
94	1865̄	1914	1963	2013	2062	2112	2161	2210	2260	2309	
95	2358	2408	2457	2507	2556	2605	2655̄	2704	2753	2803	
96	2852	2902	2951	3000	3050	3099	3148	3198	3247	3297	
97	3346	3395	3445̄	3494	3543	3593	3642	3691	3741	3790	
98	3840	3889	3938	3988	4037	4086	4136	4185	4234	4284	
99	4333	4383	4432	4481	4531	4580	4629	4679	4728	4777	
8800	4827	4876	4925	4975̄	5024	5073	5123	5172	5222	5271	
N.	0	1	2	3	4	5	6	7	8	9	P. P.

N.	0	1	2	3	4	5	6	7	8	9	P. P.
8800	944 4827	4876	4925	4975̅	5024	5073	5123	5172	5222	5271	
01	5320	5370	5419	5468	5518	5567	5616	5666	5715̅	5764	
02	5814	5863	5912	5962	6011	6060	6110	6159	6208	6258	
03	6307	6356	6406	6455	6504	6554	6603	6652	6702	6751	
04	6800	6850	6899	6948	6998	7047	7096	7146	7195̅	7244	
05	7294	7343	7392	7442	7491	7540	7590	7639	7688	7737	
06	7787	7836	7885	7935̅	7984	8033	8083	8132	8181	8231	
07	8280	8329	8379	8428	8477	8527	8576	8625	8674	8724	
08	8773	8822	8872	8921	8970	9020	9069	9118	9167	9217	
09	9266	9315	9365̅	9414	9463	9513	9562	9611	9660	9710	
8810	9759	9808	9858	9907	9956	0̅006	0̅055̅	0̅104	0̅153	0̅203	
11	945 0252	0301	0351	0400	0449	0498	0548	0597	0646	0696	50
12	0745̅	0794	0843	0893	0942	0991	1041	1090	1139	1188	1 5.0
13	1238	1287	1336	1386	1435̅	1484	1533	1583	1632	1681	2 10.0
14	1730	1780	1829	1878	1928	1977	2026	2075	2125̅	2174	3 15.0
15	2223	2272	2322	2371	2420	2469	2519	2568	2617	2667	4 20.0
16	2716	2765	2814	2864	2913	2962	3011	3061	3110	3159	5 25.0 6 30.0
17	3208	3258	3307	3356	3405	3455̅	3504	3553	3602	3652	7 35.0
18	3701	3750	3799	3849	3898	3947	3996	4046	4095̅	4144	8 40.0
19	4193	4243	4292	4341	4390	4440	4489	4538	4587	4637	9 45.0
8820	4686	4735	4784	4834	4883	4932	4981	5031	5080	5129	
21	5178	5227	5277	5326	5375	5424	5474	5523	5572	5621	
22	5671	5720	5769	5818	5867	5917	5966	6015	6064	6114	
23	6163	6212	6261	6310	6360	6409	6458	6507	6557	6606	
24	6655̅	6704	6753	6803	6852	6901	6950	7000	7049	7098	
25	7147	7196	7246	7295̅	7344	7393	7442	7492	7541	7590	
26	7639	7688	7738	7787	7836	7885	7934	7984	8033	8082	
27	8131	8180	8230	8279	8328	8377	8426	8476	8525̅	8574	
28	8623	8672	8722	8771	8820	8869	8918	8968	9017	9066	
29	9115	9164	9214	9263	9312	9361	9410	9459	9509	9558	
8830	9607	9656	9705	9755̅	9804	9853	9902	9951	0̅000	0̅050	
31	946 0099	0148	0197	0246	0296	0345̅	0394	0443	0492	0541	49
32	0591	0640	0689	0738	0787	0836	0886	0935̅	0984	1033	1 4.9
33	1082	1131	1181	1230	1279	1328	1377	1426	1476	1525̅	2 9.8
34	1574	1623	1672	1721	1771	1820	1869	1918	1967	2016	3 14.7 4 19.6
35	2066	2115̅	2164	2213	2262	2311	2360	2410	2459	2508	5 24.5
36	2557	2606	2655	2705̅	2754	2803	2852	2901	2950	2999	6 29.4
37	3049	3098	3147	3196	3245	3294	3343	3393	3442	3491	7 34.3
38	3540	3589	3638	3687	3737	3786	3835̅	3884	3933	3982	8 39.2
39	4031	4080	4130	4179	4228	4277	4326	4375	4424	4474	9 44.1
8840	4523	4572	4621	4670	4719	4768	4817	4867	4916	4965̅	
41	5014	5063	5112	5161	5210	5260	5309	5358	5407	5456	
42	5505	5554	5603	5652	5702	5751	5800	5849	5898	5947	
43	5996	6045	6094	6144	6193	6242	6291	6340	6389	6438	
44	6487	6536	6586	6635̅	6684	6733	6782	6831	6880	6929	
45	6978	7027	7077	7126	7175̅	7224	7273	7322	7371	7420	
46	7469	7518	7568	7617	7666	7715̅	7764	7813	7862	7911	
47	7960	8009	8058	8108	8157	8206	8255̅	8304	8353	8402	
48	8451	8500	8549	8598	8647	8697	8746	8795̅	8844	8893	
49	8942	8991	9040	9089	9138	9187	9236	9285	9335̅	9384	
8850	9433	9482	9531	9580	9629	9678	9727	9776	9825	9874	
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8850	946 9433	9482	9531	9580	9629	9678	9727	9776	9825	9874
51	9923	9972	0̄022	0̄071	0̄120	0̄169	0̄218	0̄267	0̄316	0̄365̄
52	947 0414	0463	0512	0561	0610	0659	0708	0757	0807	0856
53	0905̄	0954	1003	1052	1101	1150	1199	1248	1297	1346
54	1395	1444	1493	1542	1591	1640	1689	1739	1788	1837
55	1886	1935̄	1984	2033	2082	2131	2180	2229	2278	2327
56	2376	2425	2474	2523	2572	2621	2670	2719	2768	2817
57	2866	2915	2965̄	3014	3063	3112	3161	3210	3259	3308
58	3357	3406	3455̄	3504	3553	3602	3651	3700	3749	3798
59	3847	3896	3945	3994	4043	4092	4141	4190	4239	4288
8860	4337	4386	4435	4484	4533	4582	4631	4680	4729	4778
61	4827	4876	4925	4974	5023	5072	5121	5170	5219	5268
62	5317	5366	5415	5464	5513	5562	5611	5660	5709	5758
63	5807	5856	5905	5954	6003	6052	6101	6150	6199	6248
64	6297	6346	6395	6444	6493	6542	6591	6640	6689	6738
65	6787	6836	6885	6934	6983	7032	7081	7130	7179	7228
66	7277	7326	7375	7424	7473	7522	7571	7620	7669	7718
67	7767	7816	7865	7914	7963	8012	8061	8110	8159	8208
68	8257	8306	8355̄	8404	8453	8502	8551	8600	8649	8698
69	8747	8796	8844	8893	8942	8991	9040	9089	9138	9187
8870	9236	9285	9334	9383	9432	9481	9530	9579	9628	9677
71	9726	9775̄	9824	9873	9922	9971	0̄020	0̄068	0̄117	0̄166
72	948 0215	0264	0313	0362	0411	0460	0509	0558	0607	0656
73	0705̄	0754	0803	0852	0901	0950	0998	1047	1096	1145
74	1194	1243	1292	1341	1390	1439	1488	1537	1586	1635̄
75	1684	1733	1781	1830	1879	1928	1977	2026	2075	2124
76	2173	2222	2271	2320	2369	2418	2467	2515	2564	2613
77	2662	2711	2760	2809	2858	2907	2956	3005̄	3054	3102
78	3151	3200	3249	3298	3347	3396	3445̄	3494	3543	3592
79	3641	3689	3738	3787	3836	3885	3934	3983	4032	4081
8880	4130	4179	4227	4276	4325	4374	4423	4472	4521	4570
81	4619	4668	4717	4765	4814	4863	4912	4961	5010	5059
82	5108	5157	5205	5254	5303	5352	5401	5450	5499	5548
83	5597	5646	5694	5743	5792	5841	5890	5939	5988	6037
84	6085	6134	6183	6232	6281	6330	6379	6428	6477	6525
85	6574	6623	6672	6721	6770	6819	6868	6916	6965	7014
86	7063	7112	7161	7210	7259	7307	7356	7405	7454	7503
87	7552	7601	7650	7698	7747	7796	7845	7894	7943	7992
88	8040	8089	8138	8187	8236	8285̄	8334	8382	8431	8480
89	8529	8578	8627	8676	8724	8773	8822	8871	8920	8969
8890	9018	9066	9115	9164	9213	9262	9311	9360	9408	9457
91	9506	9555̄	9604	9653	9701	9750	9799	9848	9897	9946
92	9995̄	0̄043	0̄092	0̄141	0̄190	0̄239	0̄288	0̄336	0̄385	0̄434
93	949 0483	0532	0581	0629	0678	0727	0776	0825̄	0874	0922
94	0971	1020	1069	1118	1167	1215	1264	1313	1362	1411
95	1460	1508	1557	1606	1655̄	1704	1752	1801	1850	1899
96	1948	1997	2045	2094	2143	2192	2241	2289	2338	2387
97	2436	2485̄	2534	2582	2631	2680	2729	2778	2826	2875
98	2924	2973	3022	3070	3119	3168	3217	3266	3314	3363
99	3412	3461	3510	3558	3607	3656	3705̄	3754	3802	3851
8900	3900	3949	3998	4046	4095	4144	4193	4242	4290	4339
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8900 — 8950

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8900	949 3900	3949	3998	4046	4095	4144	4193	4242	4290	4339
01	4388	4437	4486	4534	4583	4632	4681	4730	4778	4827
02	4876	4925̄	4973	5022	5071	5120	5169	5217	5266	5315̄
03	5364	5413	5461	5510	5559	5608	5656	5705	5754	5803
04	5852	5900	5949	5998	6047	6095	6144	6193	6242	6290
05	6339	6388	6437	6486	6534	6583	6632	6681	6729	6778
06	6827	6876	6924	6973	7022	7071	7119	7168	7217	7266
07	7315̄	7363	7412	7461	7510	7558	7607	7656	7705̄	7753
08	7802	7851	7900	7948	7997	8046	8095̄	8143	8192	8241
09	8290	8338	8387	8436	8485̄	8533	8582	8631	8680	8728
8910	8777	8826	8875̄	8923	8972	9021	9069	9118	9167	9216
11	9264	9313	9362	9411	9459	9508	9557	9606	9654	9703
12	9752	9801	9849	9898	9947	9995	0̄044	0̄093	0̄142	0̄190
13	950 0239	0288	0337	0385	0434	0483	0531	0580	0629	0678
14	0726	0775	0824	0872	0921	0970	1019	1067	1116	1165̄
15	1213	1262	1311	1360	1408	1457	1506	1554	1603	1652
16	1701	1749	1798	1847	1895	1944	1993	2042	2090	2139
17	2188	2236	2285	2334	2382	2431	2480	2529	2577	2626
18	2675̄	2723	2772	2821	2869	2918	2967	3016	3064	3113
19	3162	3210	3259	3308	3356	3405	3454	3502	3551	3600
8920	3649	3697	3746	3795̄	3843	3892	3941	3989	4038	4087
21	4135	4184	4233	4281	4330	4379	4427	4476	4525̄	4574
22	4622	4671	4720	4768	4817	4866	4914	4963	5012	5060
23	5109	5158	5206	5255̄	5304	5352	5401	5450	5498	5547
24	5596	5644	5693	5742	5790	5839	5888	5936	5985̄	6034
25	6082	6131	6180	6228	6277	6326	6374	6423	6472	6520
26	6569	6617	6666	6715̄	6763	6812	6861	6909	6958	7007
27	7055	7104	7153	7201	7250	7299	7347	7396	7445̄	7493
28	7542	7590	7639	7688	7736	7785	7834	7882	7931	7980
29	8028	8077	8126	8174	8223	8271	8320	8369	8417	8466
8930	8515̄	8563	8612	8660	8709	8758	8806	8855	8904	8952
31	9001	9050	9098	9147	9195	9244	9293	9341	9390	9439
32	9487	9536	9584	9633	9682	9730	9779	9827	9876	9925̄
33	9973	0̄022	0̄071	0̄119	0̄168	0̄216	0̄265	0̄314	0̄362	0̄411
34	951 0459	0508	0557	0605	0654	0703	0751	0800	0848	0897
35	0946	0994	1043	1091	1140	1189	1237	1286	1334	1383
36	1432	1480	1529	1577	1626	1675̄	1723	1772	1820	1869
37	1918	1966	2015̄	2063	2112	2161	2209	2258	2306	2355̄
38	2404	2452	2501	2549	2598	2646	2695	2744	2792	2841
39	2889	2938	2987	3035	3084	3132	3181	3229	3278	3327
8940	3375	3424	3472	3521	3569	3618	3667	3715	3764	3812
41	3861	3910	3958	4007	4055	4104	4152	4201	4250	4298
42	4347	4395	4444	4492	4541	4589	4638	4687	4735	4784
43	4832	4881	4929	4978	5027	5075	5124	5172	5221	5269
44	5318	5366	5415	5464	5512	5561	5609	5658	5706	5755̄
45	5803	5852	5901	5949	5998	6046	6095̄	6143	6192	6240
46	6289	6337	6386	6435̄	6483	6532	6580	6629	6677	6726
47	6774	6823	6871	6920	6969	7017	7066	7114	7163	7211
48	7260	7308	7357	7405	7454	7502	7551	7599	7648	7697
49	7745	7794	7842	7891	7939	7988	8036	8085̄	8133	8182
8950	8230	8279	8327	8376	8424	8473	8521	8570	8619	8667
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8950	951 8230	8279	8327	8376	8424	8473	8521	8570	8619	8667
51	8716	8764	8813	8861	8910	8958	9007	9055	9104	9152
52	9201	9249	9298	9346	9395	9443	9492	9540	9589	9637
53	9686	9734	9783	9831	9880	9928	9977	0̄025	0̄074	0̄122
54	952 0171	0219	0268	0316	0365	0413	0462	0510	0559	0607
55	0656	0704	0753	0801	0850	0898	0947	0995	1044	1092
56	1141	1189	1238	1286	1335	1383	1432	1480	1529	1577
57	1626	1674	1723	1771	1820	1868	1917	1965	2014	2062
58	2111	2159	2208	2256	2305	2353	2401	2450	2498	2547
59	2595	2644	2692	2741	2789	2838	2886	2935	2983	3032
8960	3080	3129	3177	3226	3274	3322	3371	3419	3468	3516
61	3565	3613	3662	3710	3759	3807	3856	3904	3952	4001
62	4049	4098	4146	4195	4243	4292	4340	4389	4437	4486
63	4534	4582	4631	4679	4728	4776	4825	4873	4922	4970
64	5018	5067	5115	5164	5212	5261	5309	5358	5406	5454
65	5503	5551	5600	5648	5697	5745	5794	5842	5890	5939
66	5987	6036	6084	6133	6181	6230	6278	6326	6375	6423
67	6472	6520	6569	6617	6665	6714	6762	6811	6859	6908
68	6956	7004	7053	7101	7150	7198	7247	7295	7343	7392
69	7440	7489	7537	7586	7634	7682	7731	7779	7828	7876
8970	7924	7973	8021	8070	8118	8167	8215	8263	8312	8360
71	8409	8457	8505	8554	8602	8651	8699	8747	8796	8844
72	8893	8941	8989	9038	9086	9135	9183	9231	9280	9328
73	9377	9425	9473	9522	9570	9619	9667	9715	9764	9812
74	9861	9909	9957	0̄006	0̄054	0̄103	0̄151	0̄199	0̄248	0̄296
75	953 0345	0393	0441	0490	0538	0587	0635	0683	0732	0780
76	0828	0877	0925	0974	1022	1070	1119	1167	1215	1264
77	1312	1361	1409	1457	1506	1554	1603	1651	1699	1748
78	1796	1844	1893	1941	1989	2038	2086	2135	2183	2231
79	2280	2328	2376	2425	2473	2522	2570	2618	2667	2715
8980	2763	2812	2860	2908	2957	3005	3054	3102	3150	3199
81	3247	3295	3344	3392	3440	3489	3537	3585	3634	3682
82	3731	3779	3827	3876	3924	3972	4021	4069	4117	4166
83	4214	4262	4311	4359	4407	4456	4504	4552	4601	4649
84	4697	4746	4794	4842	4891	4939	4987	5036	5084	5132
85	5181	5229	5277	5326	5374	5422	5471	5519	5567	5616
86	5664	5712	5761	5809	5857	5906	5954	6002	6051	6099
87	6147	6196	6244	6292	6341	6389	6437	6486	6534	6582
88	6631	6679	6727	6776	6824	6872	6921	6969	7017	7065
89	7114	7162	7210	7259	7307	7355	7404	7452	7500	7549
8990	7597	7645	7694	7742	7790	7838	7887	7935	7983	8032
91	8080	8128	8177	8225	8273	8321	8370	8418	8466	8515
92	8563	8611	8660	8708	8756	8804	8853	8901	8949	8998
93	9046	9094	9143	9191	9239	9287	9336	9384	9432	9481
94	9529	9577	9625	9674	9722	9770	9819	9867	9915	9963
95	954 0012	0060	0108	0157	0205	0253	0301	0350	0398	0446
96	0494	0543	0591	0639	0688	0736	0784	0832	0881	0929
97	0977	1025	1074	1122	1170	1219	1267	1315	1363	1412
98	1460	1508	1556	1605	1653	1701	1749	1798	1846	1894
99	1943	1991	2039	2087	2136	2184	2232	2280	2329	2377
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P. P.

9000 — 9050

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9000	954 2425	2473	2522	2570	2618	2666	2715̄	2763	2811	2859	
01	2908	2956	3004	3052	3101	3149	3197	3245	3294	3342	
02	3390	3438	3487	3535̄	3583	3631	3680	3728	3776	3824	
03	3873	3921	3969	4017	4065	4114	4162	4210	4258	4307	
04	4355̄	4403	4451	4500	4548	4596	4644	4692	4741	4789	
05	4837	4885	4934	4982	5030	5078	5127	5175̄	5223	5271	
06	5319	5368	5416	5464	5512	5561	5609	5657	5705	5753	
07	5802	5850	5898	5946	5994	6043	6091	6139	6187	6236	
08	6284	6332	6380	6428	6477	6525̄	6573	6621	6669	6718	
09	6766	6814	6862	6910	6959	7007	7055	7103	7152	7200	
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11	7730	7778	7826	7874	7923	7971	8019	8067	8115	8164	
12	8212	8260	8308	8356	8405̄	8453	8501	8549	8597	8646	
13	8694	8742	8790	8838	8886	8935̄	8983	9031	9079	9127	
14	9176	9224	9272	9320	9368	9416	9465̄	9513	9561	9609	
15	9657	9705	9754	9802	9850	9898	9946	9995̄	0̄043	0̄091	
16	955 0139	0187	0235	0284	0332	0380	0428	0476	0524	0573	
17	0621	0669	0717	0765	0813	0862	0910	0958	1006	1054	
18	1102	1150	1199	1247	1295̄	1343	1391	1439	1488	1536	
19	1584	1632	1680	1728	1776	1825̄	1873	1921	1969	2017	
9020	2065	2114	2162	2210	2258	2306	2354	2402	2451	2499	
21	2547	2595̄	2643	2691	2739	2788	2836	2884	2932	2980	
22	3028	3076	3125̄	3173	3221	3269	3317	3365	3413	3461	
23	3510	3558	3606	3654	3702	3750	3798	3846	3895̄	3943	
24	3991	4039	4087	4135	4183	4231	4280	4328	4376	4424	
25	4472	4520	4568	4616	4665̄	4713	4761	4809	4857	4905	
26	4953	5001	5050	5098	5146	5194	5242	5290	5338	5386	
27	5434	5483	5531	5579	5627	5675̄	5723	5771	5819	5867	
28	5916	5964	6012	6060	6108	6156	6204	6252	6300	6348	
29	6397	6445̄	6493	6541	6589	6637	6685	6733	6781	6829	
9030	6878	6926	6974	7022	7070	7118	7166	7214	7262	7310	
31	7358	7407	7455̄	7503	7551	7599	7647	7695	7743	7791	
32	7839	7887	7935	7984	8032	8080	8128	8176	8224	8272	
33	8320	8368	8416	8464	8512	8560	8609	8657	8705̄	8753	
34	8801	8849	8897	8945	8993	9041	9089	9137	9185	9234	
35	9282	9330	9378	9426	9474	9522	9570	9618	9666	9714	
36	9762	9810	9858	9906	9954	0̄003	0̄051	0̄099	0̄147	0̄195̄	
37	956 0243	0291	0339	0387	0435	0483	0531	0579	0627	0675	
38	0723	0771	0819	0868	0916	0964	1012	1060	1108	1156	
39	1204	1252	1300	1348	1396	1444	1492	1540	1588	1636	
9040	1684	1732	1780	1828	1876	1925̄	1973	2021	2069	2117	
41	2165̄	2213	2261	2309	2357	2405̄	2453	2501	2549	2597	
42	2645	2693	2741	2789	2837	2885	2933	2981	3029	3077	
43	3125	3173	3221	3269	3317	3365	3413	3461	3509	3558	
44	3606	3654	3702	3750	3798	3846	3894	3942	3990	4038	
45	4086	4134	4182	4230	4278	4326	4374	4422	4470	4518	
46	4566	4614	4662	4710	4758	4806	4854	4902	4950	4998	
47	5046	5094	5142	5190	5238	5286	5334	5382	5430	5478	
48	5526	5574	5622	5670	5718	5766	5814	5862	5910	5958	
49	6006	6054	6102	6150	6198	6246	6294	6342	6390	6438	
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53	7925	7973	8021	8069	8117	8165	8213	8261	8309	8357	
54	8405̄	8453	8501	8549	8597	8645̄	8693	8741	8789	8837	
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56	9364	9412	9460	9508	9556	9604	9652	9700	9748	9796	
57	9844	9892	9940	9988	0̄035	0̄083	0̄131	0̄179	0̄227	0̄275	
58	957 0323	0371	0419	0467	0515̄	0563	0611	0659	0707	0755̄	
59	0803	0851	0898	0946	0994	1042	1090	1138	1186	1234	
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61	1761	1809	1857	1905	1953	2001	2049	2097	2145̄	2193	48 1 4.8 2 9.6 3 14.4 4 19.2 5 24.0 6 28.8 7 33.6 8 38.4 9 43.2
62	2241	2289	2336	2384	2432	2480	2528	2576	2624	2672	
63	2720	2768	2816	2864	2911	2959	3007	3055	3103	3151	
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73	7509	7557	7605̄	7653	7701	7748	7796	7844	7892	7940	
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77	9423	9471	9519	9567	9615̄	9663	9710	9758	9806	9854	
78	9902	9950	9997	0̄045	0̄093	0̄141	0̄189	0̄237	0̄284	0̄332	
79	958 0380	0428	0476	0524	0571	0619	0667	0715̄	0763	0811	
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82	1815̄	1863	1911	1958	2006	2054	2102	2150	2198	2245	
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84	2771	2819	2867	2915̄	2962	3010	3058	3106	3154	3202	
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91	6117	6164	6212	6260	6308	6355	6403	6451	6499	6547	
92	6594	6642	6690	6738	6785	6833	6881	6929	6976	7024	
93	7072	7120	7167	7215	7263	7311	7358	7406	7454	7502	
94	7549	7597	7645	7693	7741	7788	7836	7884	7932	7979	
95	8027	8075̄	8123	8170	8218	8266	8314	8361	8409	8457	
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97	8982	9030	9077	9125	9173	9221	9268	9316	9364	9412	
98	9459	9507	9555̄	9603	9650	9698	9746	9793	9841	9889	
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04	2322	2370	2418	2466	2513	2561	2609	2656	2704	2752	
05	2800	2847	2895̄	2943	2990	3038	3086	3133	3181	3229	
06	3276	3324	3372	3420	3467	3515̄	3563	3610	3658	3706	
07	3753	3801	3849	3896	3944	3992	4039	4087	4135̄	4183	
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09	4707	4755̄	4802	4850	4898	4945	4993	5041	5088	5136	
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12	6137	6185̄	6232	6280	6328	6375	6423	6471	6518	6566	
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14	7090	7138	7186	7233	7281	7328	7376	7424	7471	7519	
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23	1377	1424	1472	1520	1567	1615̄	1662	1710	1758	1805	
24	1853	1900	1948	1996	2043	2091	2138	2186	2234	2281	
25	2329	2376	2424	2472	2519	2567	2614	2662	2709	2757	
26	2805̄	2852	2900	2947	2995̄	3043	3090	3138	3185	3233	
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32	5659	5707	5754	5802	5849	5897	5944	5992	6039	6087	
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39	8987	9034	9082	9129	9177	9224	9272	9319	9367	9414	
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43	0887	0935̄	0982	1030	1077	1125̄	1172	1220	1267	1315̄	
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45	1837	1885̄	1932	1980	2027	2075̄	2122	2170	2217	2264	
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47	2787	2834	2882	2929	2977	3024	3072	3119	3167	3214	
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49	3736	3784	3831	3879	3926	3974	4021	4069	4116	4163	
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56	7058	7105	7153	7200	7248	7295̄	7342	7390	7437	7485̄	
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62	9903	9950	9998	0̄045	0̄092	0̄140	0̄187	0̄235̄	0̄282	0̄329	
63	962 0377	0424	0472	0519	0566	0614	0661	0709	0756	0803	
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65	1325̄	1372	1419	1467	1514	1562	1609	1656	1704	1751	
66	1799	1846	1893	1941	1988	2035	2083	2130	2178	2225̄	
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75	6061	6108	6155	6203	6250	6297	6345̄	6392	6439	6487	
76	6534	6581	6629	6676	6723	6771	6818	6865	6913	6960	
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81	8900	8947	8994	9042	9089	9136	9184	9231	9278	9326	47 1 4.7 2 9.4 3 14.1 4 18.8 5 23.5 6 28.2 7 32.9 8 37.6 9 42.3
82	9373	9420	9467	9515̄	9562	9609	9657	9704	9751	9799	
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87	1737	1784	1832	1879	1926	1974	2021	2068	2115	2163	
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91	3628	3675̄	3722	3769	3817	3864	3911	3958	4006	4053	
92	4100	4147	4195̄	4242	4289	4336	4384	4431	4478	4525	
93	4573	4620	4667	4714	4762	4809	4856	4903	4951	4998	
94	5045̄	5092	5139	5187	5234	5281	5328	5376	5423	5470	
95	5517	5565̄	5612	5659	5706	5753	5801	5848	5895	5942	
96	5990	6037	6084	6131	6179	6226	6273	6320	6367	6415̄	
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19	6838	6885	6932	6979	7027	7074	7121	7168	7215	7262	
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22	8251	8298	8345	8392	8440	8487	8534	8581	8628	8675	
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36	4839	4886	4933	4980	5027	5074	5121	5168	5215	5262	
37	5309	5356	5403	5450	5497	5545	5592	5639	5686	5733	
38	5780	5827	5874	5921	5968	6015	6062	6109	6156	6203	
39	6250	6297	6344	6391	6438	6485	6532	6579	6626	6673	
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41	7190	7237	7284	7331	7378	7425	7472	7519	7566	7613	
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43	8130	8177	8224	8270	8317	8364	8411	8458	8505	8552	
44	8599	8646	8693	8740	8787	8834	8881	8928	8975	9022	
45	9069	9116	9163	9210	9257	9304	9351	9398	9445	9492	
46	9539	9586	9633	9680	9727	9774	9821	9868	9915	9962	
47	966 0009	0056	0103	0149	0196	0243	0290	0337	0384	0431	
48	0478	0525	0572	0619	0666	0713	0760	0807	0854	0901	
49	0948	0995	1042	1089	1136	1183	1230	1276	1323	1370	
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52	2356	2403	2450	2497	2544	2591	2638	2685̄	2732	2779	
53	2826	2873	2919	2966	3013	3060	3107	3154	3201	3248	
54	3295̄	3342	3389	3436	3483	3530	3577	3623	3670	3717	
55	3764	3811	3858	3905	3952	3999	4046	4093	4140	4187	
56	4233	4280	4327	4374	4421	4468	4515̄	4562	4609	4656	
57	4703	4750	4796	4843	4890	4937	4984	5031	5078	5125̄	
58	5172	5219	5266	5312	5359	5406	5453	5500	5547	5594	
59	5641	5688	5735̄	5782	5828	5875	5922	5969	6016	6063	
9260	6110	6157	6204	6251	6297	6344	6391	6438	6485	6532	
61	6579	6626	6673	6720	6766	6813	6860	6907	6954	7001	47
62	7048	7095̄	7142	7188	7235	7282	7329	7376	7423	7470	1 4.7
63	7517	7564	7610	7657	7704	7751	7798	7845̄	7892	7939	2 9.4
64	7985	8032	8079	8126	8173	8220	8267	8314	8360	8407	3 14.1
65	8454	8501	8548	8595̄	8642	8689	8735	8782	8829	8876	4 18.8
66	8923	8970	9017	9064	9110	9157	9204	9251	9298	9345̄	5 23.5
67	9392	9438	9485	9532	9579	9626	9673	9720	9767	9813	6 28.2
68	9860	9907	9954	0̄001	0̄048	0̄095̄	0̄141	0̄188	0̄235	0̄282	7 32.9
69	967 0329	0376	0423	0469	0516	0563	0610	0657	0704	0750	8 37.6
9270	0797	0844	0891	0938	0985̄	1032	1078	1125	1172	1219	9 42.3
71	1266	1313	1359	1406	1453	1500	1547	1594	1641	1687	
72	1734	1781	1828	1875̄	1922	1968	2015	2062	2109	2156	
73	2203	2249	2296	2343	2390	2437	2484	2530	2577	2624	
74	2671	2718	2765̄	2811	2858	2905	2952	2999	3046	3092	
75	3139	3186	3233	3280	3326	3373	3420	3467	3514	3561	
76	3607	3654	3701	3748	3795̄	3841	3888	3935	3982	4029	
77	4076	4122	4169	4216	4263	4310	4356	4403	4450	4497	
78	4544	4590	4637	4684	4731	4778	4825̄	4871	4918	4965̄	
79	5012	5059	5105	5152	5199	5246	5293	5339	5386	5433	
9280	5480	5527	5573	5620	5667	5714	5761	5807	5854	5901	
81	5948	5995̄	6041	6088	6135̄	6182	6228	6275	6322	6369	46
82	6416	6462	6509	6556	6603	6650	6696	6743	6790	6837	1 4.6
83	6884	6930	6977	7024	7071	7117	7164	7211	7258	7305̄	2 9.2
84	7351	7398	7445̄	7492	7538	7585	7632	7679	7726	7772	3 13.8
85	7819	7866	7913	7959	8006	8053	8100	8146	8193	8240	4 18.4
86	8287	8334	8380	8427	8474	8521	8567	8614	8661	8708	5 23.0
87	8754	8801	8848	8895̄	8942	8988	9035	9082	9129	9175	6 27.6
88	9222	9269	9316	9362	9409	9456	9503	9549	9596	9643	7 32.2
89	9690	9736	9783	9830	9877	9923	9970	0̄017	0̄064	0̄110	8 36.8
9290	968 0157	0204	0251	0297	0344	0391	0438	0484	0531	0578	9 41.4
91	0625̄	0671	0718	0765̄	0812	0858	0905	0952	0999	1045	
92	1092	1139	1185	1232	1279	1326	1372	1419	1466	1513	
93	1559	1606	1653	1700	1746	1793	1840	1886	1933	1980	
94	2027	2073	2120	2167	2214	2260	2307	2354	2400	2447	
95	2494	2541	2587	2634	2681	2728	2774	2821	2868	2914	
96	2961	3008	3055̄	3101	3148	3195̄	3241	3288	3335̄	3382	
97	3428	3475	3522	3568	3615	3662	3709	3755	3802	3849	
98	3895	3942	3989	4036	4082	4129	4176	4222	4269	4316	
99	4362	4409	4456	4503	4549	4596	4643	4689	4736	4783	
9300	4829	4876	4923	4970	5016	5063	5110	5156	5203	5250	
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9300	968 4829	4876	4923	4970	5016	5063	5110	5156	5203	5250	
01	5296	5343	5390	5437	5483	5530	5577	5623	5670	5717	
02	5763	5810	5857	5903	5950	5997	6043	6090	6137	6184	
03	6230	6277	6324	6370	6417	6464	6510	6557	6604	6650	
04	6697	6744	6790	6837	6884	6930	6977	7024	7070	7117	
05	7164	7210	7257	7304	7350	7397	7444	7490	7537	7584	
06	7630	7677	7724	7770	7817	7864	7910	7957	8004	8050	
07	8097	8144	8190	8237	8284	8330	8377	8424	8470	8517	
08	8564	8610	8657	8704	8750	8797	8844	8890	8937	8984	
09	9030	9077	9124	9170	9217	9264	9310	9357	9404	9450	
9310	9497	9543	9590	9637	9683	9730	9777	9823	9870	9917	
11	9963	0̄010	0̄057	0̄103	0̄150	0̄196	0̄243	0̄290	0̄336	0̄383	47 1 4.7 2 9.4 3 14.1 4 18.8 5 23.5 6 28.2 7 32.9 8 37.6 9 42.3
12	969 0430	0476	0523	0570	0616	0663	0709	0756	0803	0849	
13	0896	0943	0989	1036	1083	1129	1176	1222	1269	1316	
14	1362	1409	1456	1502	1549	1595	1642	1689	1735	1782	
15	1829	1875	1922	1968	2015	2062	2108	215̄5̄	2202	2248	
16	229̄5̄	2341	2388	243̄5̄	2481	2528	2574	2621	2668	2714	
17	2761	2808	2854	2901	2947	2994	3041	3087	3134	3180	
18	3227	3274	3320	3367	3413	3460	3507	3553	3600	3647	
19	3693	3740	3786	3833	3880	3926	3973	4019	4066	4113	
9920	4159	4206	4252	4299	4346	4392	4439	4485	4532	4578	
21	4625	4672	4718	476̄5̄	4811	4858	490̄5̄	4951	4998	5044	
22	5091	5138	5184	5231	5277	5324	5371	5417	5464	5510	
23	5557	5603	5650	5697	5743	5790	5836	5883	5929	5976	
24	6023	6069	6116	6162	6209	6256	6302	6349	6395	6442	
25	6488	653̄5̄	6582	6628	667̄5̄	6721	6768	6814	6861	6908	
26	6954	7001	7047	7094	7140	7187	7234	7280	7327	7373	
27	7420	7466	7513	7559	7606	7653	7699	7746	7793	7839	
28	7885	7932	7978	8025	8072	8118	816̄5̄	8211	8258	8304	
29	8351	8397	8444	8491	8537	8584	8630	8677	8723	8770	
9330	8816	8863	8910	8956	9003	9049	9096	9142	9189	9235	
31	9282	9328	937̄5̄	9422	9468	951̄5̄	9561	9608	9654	9701	46 1 4.6 2 9.2 3 13.8 4 18.4 5 23.0 6 27.6 7 32.2 8 36.8 9 41.4
32	9747	9794	9840	9887	9933	9980	0̄027	0̄073	0̄120	0̄166	
33	970 0213	0259	0306	0352	0399	0445	0492	0538	058̄5̄	0631	
34	0678	0724	0771	0818	0864	0911	0957	1004	1050	1097	
35	1143	1190	1236	1283	1329	1376	1422	1469	1515	1562	
36	1608	165̄5̄	1701	1748	1794	1841	1888	1934	1981	2027	
37	2074	2120	2167	2213	2260	2306	2353	2399	2446	2492	
38	2539	2585	2632	2678	272̄5̄	2771	2818	2864	2911	2957	
39	3004	3050	3097	3143	3190	3236	3283	3329	3376	3422	
9340	3469	3515	3562	3608	365̄5̄	3701	3748	3794	3841	3887	
41	3934	3980	4027	4073	4120	4166	4213	4259	4306	4352	
42	4399	4445	4492	4538	458̄5̄	4631	4678	4724	4771	4817	
43	4863	4910	4956	5003	5049	5096	5142	5189	5235	5282	
44	5328	537̄5̄	5421	5468	5514	5561	5607	5654	5700	5747	
45	5793	5840	5886	5932	5979	6025	6072	6118	616̄5̄	6211	
46	6258	6304	6351	6397	6444	6490	6537	6583	6629	6676	
47	6722	6769	6815	6862	6908	695̄5̄	7001	7048	7094	7141	
48	7187	7233	7280	7326	7373	7419	7466	7512	7559	7605	
49	7652	7698	774̄5̄	7791	7837	7884	7930	7977	8023	8070	
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9350	970 8116	8163	8209	8255	8302	8348	8395	8441	8488	8534	
51	8581	8627	8673	8720	8766	8813	8859	8906	8952	8999	
52	9045	9091	9138	9184	9231	9277	9324	9370	9416	9463	
53	9509	9556	9602	9649	9695	9742	9788	9834	9881	9927	
54	9974	0̄020	0̄067	0̄113	0̄159	0̄206	0̄252	0̄299	0̄345	0̄391	
55	971 0438	0484	0531	0577	0624	0670	0716	0763	0809	0856	
56	0902	0949	0995	1041	1088	1134	1181	1227	1273	1320	
57	1366	1413	1459	1506	1552	1598	1645	1691	1738	1784	
58	1830	1877	1923	1970	2016	2062	2109	2155	2202	2248	
59	2294	2341	2387	2434	2480	2526	2573	2619	2666	2712	
9360	2758	2805	2851	2898	2944	2990	3037	3083	3130	3176	
61	3222	3269	3315	3362	3408	3454	3501	3547	3594	3640	47
62	3686	3733	3779	3826	3872	3918	3965	4011	4057	4104	1 4.7
63	4150	4197	4243	4289	4336	4382	4429	4475	4521	4568	2 9.4
64	4614	4660	4707	4753	4800	4846	4892	4939	4985	5031	3 14.1
65	5078	5124	5171	5217	5263	5310	5356	5402	5449	5495	4 18.8
66	5542	5588	5634	5681	5727	5773	5820	5866	5912	5959	5 23.5
67	6005	6052	6098	6144	6191	6237	6283	6330	6376	6422	6 28.2
68	6469	6515	6562	6608	6654	6701	6747	6793	6840	6886	7 32.9 8 37.6
69	6932	6979	7025	7071	7118	7164	7211	7257	7303	7350	9 42.3
9370	7396	7442	7489	7535	7581	7628	7674	7720	7767	7813	
71	7859	7906	7952	7998	8045	8091	8137	8184	8230	8276	
72	8323	8369	8415	8462	8508	8554	8601	8647	8694	8740	
73	8786	8833	8879	8925	8972	9018	9064	9111	9157	9203	
74	9249	9296	9342	9388	9435	9481	9527	9574	9620	9666	
75	9713	9759	9805	9852	9898	9944	9991	0̄037	0̄083	0̄130	
76	972 0176	0222	0269	0315	0361	0408	0454	0500	0547	0593	
77	0639	0685	0732	0778	0824	0871	0917	0963	1010	1056	
78	1102	1149	1195	1241	1288	1334	1380	1426	1473	1519	
79	1565	1612	1658	1704	1751	1797	1843	1889	1936	1982	
9380	2028	2075	2121	2167	2214	2260	2306	2352	2399	2445	
81	2491	2538	2584	2630	2677	2723	2769	2815	2862	2908	46
82	2954	3001	3047	3093	3139	3186	3232	3278	3325	3371	1 4.6
83	3417	3463	3510	3556	3602	3649	3695	3741	3787	3834	2 9.2 3 13.8
84	3880	3926	3973	4019	4065	4111	4158	4204	4250	4296	4 18.4
85	4343	4389	4435	4482	4528	4574	4620	4667	4713	4759	5 23.0
86	4805	4852	4898	4944	4991	5037	5083	5129	5176	5222	6 27.6
87	5268	5314	5361	5407	5453	5500	5546	5592	5638	5685	7 32.2
88	5731	5777	5823	5870	5916	5962	6008	6055	6101	6147	8 36.8
89	6193	6220	6286	6332	6378	6425	6471	6517	6563	6610	9 41.4
9390	6656	6702	6748	6795	6841	6887	6933	6980	7026	7072	
91	7118	7165	7211	7257	7303	7350	7396	7442	7488	7535	
92	7581	7627	7673	7720	7766	7812	7858	7905	7951	7997	
93	8043	8089	8136	8182	8228	8274	8321	8367	8413	8459	
94	8506	8552	8598	8644	8690	8737	8783	8829	8875	8922	
95	8968	9014	9060	9107	9153	9199	9245	9291	9338	9384	
96	9430	9476	9523	9569	9615	9661	9707	9754	9800	9846	
97	9892	9938	9985	0̄031	0̄077	0̄123	0̄170	0̄216	0̄262	0̄308	
98	973 0354	0401	0447	0493	0539	0585	0632	0678	0724	0770	
99	0816	0863	0909	0955	1001	1048	1094	1140	1186	1232	
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01	1741	1787	1833	1879	1925	1972	2018	2064	2110	2156	
02	2202	2249	2295	2341	2387	2433	2480	2526	2572	2618	
03	2664	2711	2757	2803	2849	2895	2941	2988	3034	3080	
04	3126	3172	3219	3265	3311	3357	3403	3449	3496	3542	
05	3588	3634	3680	3727	3773	3819	3865	3911	3957	4004	
06	4050	4096	4142	4188	4234	4281	4327	4373	4419	4465	
07	4511	4558	4604	4650	4696	4742	4788	4835	4881	4927	
08	4973	5019	5065	5112	5158	5204	5250	5296	5342	5389	
09	5435	5481	5527	5573	5619	5665	5712	5758	5804	5850	
9410	5896	5942	5989	6035	6081	6127	6173	6219	6265	6312	
11	6358	6404	6450	6496	6542	6588	6635	6681	6727	6773	47 1 4.7 2 9.4 3 14.1 4 18.8 5 23.5 6 28.2 7 32.9 8 37.6 9 42.3
12	6819	6865	6911	6958	7004	7050	7096	7142	7188	7234	
13	7281	7327	7373	7419	7465	7511	7557	7604	7650	7696	
14	7742	7788	7834	7880	7926	7973	8019	8065	8111	8157	
15	8203	8249	8295	8342	8388	8434	8480	8526	8572	8618	
16	8664	8711	8757	8803	8849	8895	8941	8987	9033	9080	
17	9126	9172	9218	9264	9310	9356	9402	9449	9495	9541	
18	9587	9633	9679	9725	9771	9817	9864	9910	9956	0̄002	
19	974 0048	0094	0140	0186	0232	0279	0325	0371	0417	0463	
9420	0509	0555	0601	0647	0693	0740	0786	0832	0878	0924	
21	0970	1016	1062	1108	1154	1201	1247	1293	1339	1385	
22	1431	1477	1523	1569	1615	1661	1708	1754	1800	1846	
23	1892	1938	1984	2030	2076	2122	2168	2215	2261	2307	
24	2353	2399	2445	2491	2537	2583	2629	2675	2721	2768	
25	2814	2860	2906	2952	2998	3044	3090	3136	3182	3228	
26	3274	3320	3367	3413	3459	3505	3551	3597	3643	3689	
27	3735	3781	3827	3873	3919	3965	4011	4058	4104	4150	
28	4196	4242	4288	4334	4380	4426	4472	4518	4564	4610	
29	4656	4702	4748	4795	4841	4887	4933	4979	5025	5071	
9430	5117	5163	5209	5255	5301	5347	5393	5439	5485	5531	
31	5577	5623	5670	5716	5762	5808	5854	5900	5946	5992	46 1 4.6 2 9.2 3 13.8 4 18.4 5 23.0 6 27.6 7 32.2 8 36.8 9 41.4
32	6038	6084	6130	6176	6222	6268	6314	6360	6406	6452	
33	6498	6544	6590	6636	6683	6729	6775	6821	6867	6913	
34	6959	7005	7051	7097	7143	7189	7235	7281	7327	7373	
35	7419	7465	7511	7557	7603	7649	7695	7741	7787	7833	
36	7879	7925	7971	8017	8063	8109	8155	8201	8248	8294	
37	8340	8386	8432	8478	8524	8570	8616	8662	8708	8754	
38	8800	8846	8892	8938	8984	9030	9076	9122	9168	9214	
39	9260	9306	9352	9398	9444	9490	9536	9582	9628	9674	
9440	9720	9766	9812	9858	9904	9950	9996	0̄042	0̄088	0̄134	
41	975 0180	0226	0272	0318	0364	0410	0456	0502	0548	0594	
42	0640	0686	0732	0778	0824	0870	0916	0962	1008	1054	
43	1100	1146	1192	1238	1284	1330	1376	1422	1468	1514	
44	1560	1606	1652	1698	1744	1790	1836	1882	1928	1974	
45	2020	2066	2112	2158	2204	2250	2296	2341	2387	2433	
46	2479	2525	2571	2617	2663	2709	2755	2801	2847	2893	
47	2939	2985	3031	3077	3123	3169	3215	3261	3307	3353	
48	3399	3445	3491	3537	3583	3629	3675	3721	3767	3813	
49	3858	3904	3950	3996	4042	4088	4134	4180	4226	4272	
9450	4318	4364	4410	4456	4502	4548	4594	4640	4686	4732	
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9450	975 4318	4364	4410	4456	4502	4548	4594	4640	4686	4732	
51	4778	4824	4870	4915	4961	5007	5053	5099	5145	5191	
52	5237	5283	5329	5375̄	5421	5467	5513	5559	5605̄	5651	
53	5697	5743	5788	5834	5880	5926	5972	6018	6064	6110	
54	6156	6202	6248	6294	6340	6386	6432	6478	6523	6569	
55	6615	6661	6707	6753	6799	6845̄	6891	6937	6983	7029	
56	7075̄	7121	7166	7212	7258	7304	7350	7396	7442	7488	
57	7534	7580	7626	7672	7718	7763	7809	7855	7901	7947	
58	7993	8039	8085̄	8131	8177	8223	8269	8315	8360	8406	
59	8452	8498	8544	8590	8636	8682	8728	8774	8820	8865	
9460	8911	8957	9003	9049	9095̄	9141	9187	9233	9279	9325̄	
61	9370	9416	9462	9508	9554	9600	9646	9692	9738	9784	46
62	9829	9875	9921	9967	0̄013	0̄059	0̄105̄	0̄151	0̄197	0̄243	1 4.6
63	976 0288	0334	0380	0426	0472	0518	0564	0610	0656	0701	2 9.2
64	0747	0793	0839	0885̄	0931	0977	1023	1069	1114	1160	3 13.8
65	1206	1252	1298	1344	1390	1436	1481	1527	1573	1619	4 18.4
66	1665	1711	1757	1803	1849	1894	1940	1986	2032	2078	5 23.0
67	2124	2170	2216	2261	2307	2353	2399	2445̄	2491	2537	6 27.6
68	2582	2628	2674	2720	2766	2812	2858	2904	2949	2995	7 32.2
69	3041	3087	3133	3179	3225̄	3270	3316	3362	3408	3454	8 36.8
9470	3500	3546	3592	3637	3683	3729	3775̄	3821	3867	3913	9 41.4
71	3958	4004	4050	4096	4142	4188	4233	4279	4325	4371	
72	4417	4463	4509	4554	4600	4646	4692	4738	4784	4830	
73	4875	4921	4967	5013	5059	5105̄	5150	5196	5242	5288	
74	5334	5380	5425	5471	5517	5563	5609	5655̄	5701	5746	
75	5792	5838	5884	5930	5976	6021	6067	6113	6159	6205̄	
76	6251	6296	6342	6388	6434	6480	6525	6571	6617	6663	
77	6709	6755̄	6800	6846	6892	6938	6984	7030	7075	7121	
78	7167	7213	7259	7305̄	7350	7396	7442	7488	7534	7579	
79	7625	7671	7717	7763	7808	7854	7900	7946	7992	8038	
9480	8083	8129	8175̄	8221	8267	8312	8358	8404	8450	8496	
81	8541	8587	8633	8679	8725̄	8770	8816	8862	8908	8954	45
82	9000	9045	9091	9137	9183	9229	9274	9320	9366	9412	1 4.5
83	9458	9503	9549	9595̄	9641	9686	9732	9778	9824	9870	2 9.0
84	9915	9961	0̄007	0̄053	0̄099	0̄144	0̄190	0̄236	0̄282	0̄328	3 13.5
85	977 0373	0419	0465̄	0511	0556	0602	0648	0694	0740	0785	4 18.0
86	0831	0877	0923	0969	1014	1060	1106	1152	1197	1243	5 22.5
87	1289	1335̄	1381	1426	1472	1518	1564	1609	1655	1701	6 27.0
88	1747	1793	1838	1884	1930	1976	2021	2067	2113	2159	7 31.5
89	2204	2250	2296	2342	2388	2433	2479	2525̄	2571	2616	8 36.0
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91	3120	3165	3211	3257	3303	3349	3394	3440	3486	3532	
92	3577	3623	3669	3715̄	3760	3806	3852	3898	3943	3989	
93	4035̄	4081	4126	4172	4218	4264	4309	4355	4401	4447	
94	4492	4538	4584	4630	4675	4721	4767	4812	4858	4904	
95	4950	4995	5041	5087	5133	5178	5224	5270	5316	5361	
96	5407	5453	5499	5544	5590	5636	5681	5727	5773	5819	
97	5864	5910	5956	6002	6047	6093	6139	6184	6230	6276	
98	6322	6367	6413	6459	6505̄	6550	6596	6642	6687	6733	
99	6779	6825̄	6870	6916	6962	7007	7053	7099	7145̄	7190	
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01	7693	7739	7785	7830	7876	7922	7967	8013	8059	8105
02	8150	8196	8242	8287	8333	8379	8424	8470	8516	8562
03	8607	8653	8699	8744	8790	8836	8881	8927	8973	9019
04	9064	9110	9156	9201	9247	9293	9338	9384	9430	9476
05	9521	9567	9613	9658	9704	9750	9795	9841	9887	9932
06	9978	0024	0069	0115	0161	0207	0252	0298	0344	0389
07	978 0435	0481	0526	0572	0618	0663	0709	0755	0800	0846
08	0892	0937	0983	1029	1074	1120	1166	1211	1257	1303
09	1348	1394	1440	1485	1531	1577	1622	1668	1714	1760
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11	2262	2307	2353	2399	2444	2490	2536	2581	2627	2673
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13	3175	3221	3266	3312	3358	3403	3449	3495	3540	3586
14	3631	3677	3723	3768	3814	3860	3905	3951	3997	4042
15	4088	4134	4179	4225	4270	4316	4362	4407	4453	4499
16	4544	4590	4636	4681	4727	4773	4818	4864	4909	4955
17	5001	5046	5092	5138	5183	5229	5274	5320	5366	5411
18	5457	5503	5548	5594	5640	5685	5731	5776	5822	5868
19	5913	5959	6005	6050	6096	6141	6187	6233	6278	6324
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21	6826	6871	6917	6962	7008	7054	7099	7145	7191	7236
22	7282	7327	7373	7419	7464	7510	7555	7601	7647	7692
23	7738	7783	7829	7875	7920	7966	8011	8057	8103	8148
24	8194	8239	8285	8331	8376	8422	8467	8513	8559	8604
25	8650	8695	8741	8787	8832	8878	8923	8969	9015	9060
26	9106	9151	9197	9243	9288	9334	9379	9425	9470	9516
27	9562	9607	9653	9698	9744	9790	9835	9881	9926	9972
28	979 0017	0063	0109	0154	0200	0245	0291	0337	0382	0428
29	0473	0519	0564	0610	0656	0701	0747	0792	0838	0883
9530	0929	0975	1020	1066	1111	1157	1202	1248	1294	1339
31	1385	1430	1476	1521	1567	1613	1658	1704	1749	1795
32	1840	1886	1931	1977	2023	2068	2114	2159	2205	2250
33	2296	2341	2387	2433	2478	2524	2569	2615	2660	2706
34	2751	2797	2843	2888	2934	2979	3025	3070	3116	3161
35	3207	3253	3298	3344	3389	3435	3480	3526	3571	3617
36	3662	3708	3754	3799	3845	3890	3936	3981	4027	4072
37	4118	4163	4209	4254	4300	4346	4391	4437	4482	4528
38	4573	4619	4664	4710	4755	4801	4846	4892	4937	4983
39	5028	5074	5120	5165	5211	5256	5302	5347	5393	5438
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41	5939	5984	6030	6076	6121	6167	6212	6258	6303	6349
42	6394	6440	6485	6531	6576	6622	6667	6713	6758	6804
43	6849	6895	6940	6986	7031	7077	7122	7168	7213	7259
44	7304	7350	7395	7441	7486	7532	7577	7623	7668	7714
45	7759	7805	7850	7896	7941	7987	8032	8078	8123	8169
46	8214	8260	8305	8351	8396	8442	8487	8533	8578	8624
47	8669	8715	8760	8806	8851	8897	8942	8988	9033	9079
48	9124	9170	9215	9261	9306	9352	9397	9442	9488	9533
49	9579	9624	9670	9715	9761	9806	9852	9897	9943	9988
9550	980 0034	0079	0125	0170	0216	0261	0307	0352	0398	0443
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P. P.

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52	0943	0989	1034	1080	1125̄	1170	1216	1261	1307	1352	
53	1398	1443	1489	1534	1580	1625	1671	1716	1761	1807	
54	1852	1898	1943	1989	2034	2080	2125	2171	2216	2261	
55	2307	2352	2398	2443	2489	2534	2580	2625	2671	2716	
56	2761	2807	2852	2898	2943	2989	3034	3080	3125̄	3170	
57	3216	3261	3307	3352	3398	3443	3489	3534	3579	3625̄	
58	3670	3716	3761	3807	3852	3897	3943	3988	4034	4079	
59	4125̄	4170	4215	4261	4306	4352	4397	4443	4488	4533	
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61	5033	5079	5124	5169	5215̄	5260	5306	5351	5397	5442	
62	5487	5533	5578	5624	5669	5714	5760	5805	5851	5896	
63	5942	5987	6032	6078	6123	6169	6214	6259	6305̄	6350	
64	6396	6441	6486	6532	6577	6623	6668	6714	6759	6804	
65	6850	6895	6941	6986	7031	7077	7122	7168	7213	7258	
66	7304	7349	7395̄	7440	7485	7531	7576	7622	7667	7712	
67	7758	7803	7849	7894	7939	7985̄	8030	8075	8121	8166	
68	8212	8257	8302	8348	8393	8439	8484	8529	8575̄	8620	
69	8666	8711	8756	8802	8847	8892	8938	8983	9029	9074	
9570	9119	9165̄	9210	9256	9301	9346	9392	9437	9482	9528	
71	9573	9619	9664	9709	9755̄	9800	9845	9891	9936	9982	
72	981 0027	0072	0118	0163	0208	0254	0299	0344	0390	0435	
73	0481	0526	0571	0617	0662	0707	0753	0798	0844	0889	
74	0934	0980	1025̄	1070	1116	1161	1206	1252	1297	1342	
75	1388	1433	1479	1524	1569	1615̄	1660	1705	1751	1796	
76	1841	1887	1932	1977	2023	2068	2113	2159	2204	2250	
77	2295̄	2340	2386	2431	2476	2522	2567	2612	2658	2703	
78	2748	2794	2839	2884	2930	2975	3020	3066	3111	3156	
79	3202	3247	3292	3338	3383	3428	3474	3519	3564	3610	
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81	4108	4154	4199	4244	4290	4335	4380	4426	4471	4516	
82	4562	4607	4652	4698	4743	4788	4834	4879	4924	4970	
83	5015̄	5060	5106	5151	5196	5241	5287	5332	5377	5423	
84	5468	5513	5559	5604	5649	5695̄	5740	5785	5831	5876	
85	5921	5966	6012	6057	6102	6148	6193	6238	6284	6329	
86	6374	6420	6465̄	6510	6555	6601	6646	6691	6737	6782	
87	6827	6873	6918	6963	7008	7054	7099	7144	7190	7235̄	
88	7280	7326	7371	7416	7461	7507	7552	7597	7643	7688	
89	7733	7778	7824	7869	7914	7960	8005̄	8050	8095	8141	
9590	8186	8231	8277	8322	8367	8412	8458	8503	8548	8594	
91	8639	8684	8729	8775̄	8820	8865	8911	8956	9001	9046	
92	9092	9137	9182	9228	9273	9318	9363	9409	9454	9499	
93	9544	9590	9635̄	9680	9726	9771	9816	9861	9907	9952	
94	9997	0̄042	0̄088	0̄133	0̄178	0̄223	0̄269	0̄314	0̄359	0̄405̄	
95	982 0450	0495	0540	0586	0631	0676	0721	0767	0812	0857	
96	0902	0948	0993	1038	1083	1129	1174	1219	1264	1310	
97	1355̄	1400	1445	1491	1536	1581	1626	1672	1717	1762	
· 98	1807	1853	1898	1943	1988	2034	2079	2124	2169	2215̄	
99	2260	2305	2350	2396	2441	2486	2531	2577	2622	2667	
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9600	982 2712	2758	2803	2848	2893	2939	2984	3029	3074	3119	
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02	3617	3662	3707	3753	3798	3843	3888	3934	3979	4024	
03	4069	4115	4160	4205	4250	4295	4341	4386	4431	4476	
04	4522	4567	4612	4657	4702	4748	4793	4838	4883	4928	
05	4974	5019	5064	5109	5155	5200	5245	5290	5335	5381	
06	5426	5471	5516	5561	5607	5652	5697	5742	5787	5833	
07	5878	5923	5968	6014	6059	6104	6149	6194	6240	6285	
08	6330	6375	6420	6466	6511	6556	6601	6646	6692	6737	
09	6782	6827	6872	6918	6963	7008	7053	7098	7143	7189	
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11	7686	7731	7776	7821	7867	7912	7957	8002	8047	8092	46
12	8138	8183	8228	8273	8318	8364	8409	8454	8499	8544	1 4.6
13	8589	8635	8680	8725	8770	8815	8860	8906	8951	8996	2 9.2
14	9041	9086	9132	9177	9222	9267	9312	9357	9403	9448	3 13.8
15	9493	9538	9583	9628	9674	9719	9764	9809	9854	9899	4 18.4
16	9945	9990	0̄035	0̄080	0̄125	0̄170	0̄216	0̄261	0̄306	0̄351	5 23.0
17	983 0396	0441	0486	0532	0577	0622	0667	0712	0757	0803	6 27.6
18	0848	0893	0938	0983	1028	1073	1119	1164	1209	1254	7 32.2
19	1299	1344	1390	1435	1480	1525	1570	1615	1660	1706	8 36.8
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22	2654	2699	2744	2789	2834	2879	2924	2969	3015	3060	
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26	4459	4504	4549	4594	4639	4684	4729	4774	4819	4865	
27	4910	4955	5000	5045	5090	5135	5180	5225	5271	5316	
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29	5812	5857	5902	5947	5992	6037	6082	6128	6173	6218	
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31	6714	6759	6804	6849	6894	6939	6984	7029	7075	7120	45
32	7165	7210	7255	7300	7345	7390	7435	7480	7525	7571	1 4.5
33	7616	7661	7706	7751	7796	7841	7886	7931	7976	8021	2 9.0
34	8066	8111	8157	8202	8247	8292	8337	8382	8427	8472	3 13.5
35	8517	8562	8607	8652	8697	8743	8788	8833	8878	8923	4 18.0
36	8968	9013	9058	9103	9148	9193	9238	9283	9328	9374	5 22.5
37	9419	9464	9509	9554	9599	9644	9689	9734	9779	9824	6 27.0
38	9869	9914	9959	0̄004	0̄049	0̄095	0̄140	0̄185	0̄230	0̄275	7 31.5
39	984 0320	0365	0410	0455	0500	0545	0590	0635	0680	0725	8 36.0
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41	1221	1266	1311	1356	1401	1446	1491	1536	1581	1626	
42	1671	1716	1761	1806	1851	1896	1942	1987	2032	2077	
43	2122	2167	2212	2257	2302	2347	2392	2437	2482	2527	
44	2572	2617	2662	2707	2752	2797	2842	2887	2932	2977	
45	3022	3067	3112	3157	3202	3247	3292	3338	3383	3428	
46	3473	3518	3563	3608	3653	3698	3743	3788	3833	3878	
47	3923	3968	4013	4058	4103	4148	4193	4238	4283	4328	
48	4373	4418	4463	4508	4553	4598	4643	4688	4733	4778	
49	4823	4868	4913	4958	5003	5048	5093	5138	5183	5228	
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62	0670	0715	0760	0805	0850	0895	0940	0985̄	1030	1075̄	
63	1120	1165̄	1210	1255̄	1300	1345̄	1389	1434	1479	1524	
64	1569	1614	1659	1704	1749	1794	1839	1884	1929	1974	
65	2019	2064	2108	2153	2198	2243	2288	2333	2378	2423	
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67	2917	2962	3007	3052	3097	3142	3187	3232	3277	3321	
68	3366	3411	3456	3501	3546	3591	3636	3681	3726	3771	
69	3816	3861	3905	3950	3995	4040	4085	4130	4175̄	4220	
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71	4714	4759	4804	4849	4893	4938	4983	5028	5073	5118	
72	5163	5208	5253	5298	5342	5387	5432	5477	5522	5567	
73	5612	5657	5702	5747	5791	5836	5881	5926	5971	6016	
74	6061	6106	6151	6196	6240	6285	6330	6375	6420	6465̄	
75	6510	6555̄	6600	6644	6689	6734	6779	6824	6869	6914	
76	6959	7003	7048	7093	7138	7183	7228	7273	7318	7363	
77	7407	7452	7497	7542	7587	7632	7677	7722	7766	7811	
78	7856	7901	7946	7991	8036	8081	8125	8170	8215	8260	
79	8305̄	8350	8395̄	8440	8484	8529	8574	8619	8664	8709	
9680	8754	8798	8843	8888	8933	8978	9023	9068	9112	9157	
81	9202	9247	9292	9337	9382	9426	9471	9516	9561	9606	44 1 4.4 2 8.8 3 13.2 4 17.6 5 22.0 6 26.4 7 30.8 8 35.2 9 39.6
82	9651	9696	9740	9785	9830	9875	9920	9965̄	0̄010	0̄054	
83	986 0099	0144	0189	0234	0279	0324	0368	0413	0458	0503	
84	0548	0593	0637	0682	0727	0772	0817	0862	0907	0951	
85	0996	1041	1086	1131	1176	1220	1265	1310	1355̄	1400	
86	1445̄	1489	1534	1579	1624	1669	1714	1758	1803	1848	
87	1893	1938	1983	2027	2072	2117	2162	2207	2252	2296	
88	2341	2386	2431	2476	2521	2565	2610	2655	2700	2745̄	
89	2790	2834	2879	2924	2969	3014	3058	3103	3148	3193	
9690	3238	3283	3327	3372	3417	3462	3507	3551	3596	3641	
91	3686	3731	3776	3820	3865	3910	3955̄	4000	4044	4089	
92	4134	4179	4224	4268	4313	4358	4403	4448	4493	4537	
93	4582	4627	4672	4717	4761	4806	4851	4896	4941	4985	
94	5030	5075̄	5120	5165̄	5209	5254	5299	5344	5389	5433	
95	5478	5523	5568	5613	5657	5702	5747	5792	5836	5881	
96	5926	5971	6016	6060	6105	6150	6195̄	6240	6284	6329	
97	6374	6419	6464	6508	6553	6598	6643	6687	6732	6777	
98	6822	6867	6911	6956	7001	7046	7090	7135	7180	7225̄	
99	7270	7314	7359	7404	7449	7493	7538	7583	7628	7673	
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9700	986 7717	7762	7807	7852	7896	7941	7986	8031	8076	8120	
01	8165	8210	8255̅	8299	8344	8389	8434	8478	8523	8568	
02	8613	8657	8702	8747	8792	8837	8881	8926	8971	9016	
03	9060	9105	9150	9195̅	9239	9284	9329	9374	9418	9463	
04	9508	9553	9597	9642	9687	9732	9776	9821	9866	9911	
05	9955	0̅000	0̅045̅	0̅090	0̅134	0̅179	0̅224	0̅269	0̅313	0̅358	
06	987 0403	0448	0492	0537	0582	0627	0671	0716	0761	0806	
07	0850	0895	0940	0985̅	1029	1074	1119	1163	1208	1253	
08	1298	1342	1387	1432	1477	1521	1566	1611	1656	1700	
09	1745	1790	1834	1879	1924	1969	2013	2058	2103	2148	
9710	2192	2237	2282	2326	2371	2416	2461	2505	2550	2595̅	
11	2640	2684	2729	2774	2818	2863	2908	2953	2997	3042	45 1 4.5 2 9.0 3 13.5 4 18.0 5 22.5 6 27.0 7 31.5 8 36.0 9 40.5
12	3087	3131	3176	3221	3266	3310	3355	3400	3444	3489	
13	3534	3579	3623	3668	3713	3757	3802	3847	3892	3936	
14	3981	4026	4070	4115	4160	4205̅	4249	4294	4339	4383	
15	4428	4473	4517	4562	4607	4652	4696	4741	4786	4830	
16	4875	4920	4964	5009	5054	5099	5143	5188	5233	5277	
17	5322	5367	5411	5456	5501	5545	5590	5635̅	5680	5724	
18	5769	5814	5858	5903	5948	5992	6037	6082	6126	6171	
19	6216	6261	6305	6350	6395̅	6439	6484	6529	6573	6618	
9720	6663	6707	6752	6797	6841	6886	6931	6975	7020	7065̅	
21	7109	7154	7199	7243	7288	7333	7377	7422	7467	7511	
22	7556	7601	7646	7690	7735̅	7780	7824	7869	7914	7958	
23	8003	8048	8092	8137	8182	8226	8271	8316	8360	8405̅	
24	8450	8494	8539	8583	8628	8673	8717	8762	8807	8851	
25	8896	8941	8985	9030	9075̅	9119	9164	9209	9253	9298	
26	9343	9387	9432	9477	9521	9566	9611	9655	9700	9745̅	
27	9789	9834	9878	9923	9968	0̅012	0̅057	0̅102	0̅146	0̅191	
28	988 0236	0280	0325̅	0370	0414	0459	0503	0548	0593	0637	
29	0682	0727	0771	0816	0861	0905	0950	0994	1039	1084	
9730	1128	1173	1218	1262	1307	1352	1396	1441	1485	1530	
31	1575̅	1619	1664	1709	1753	1798	1842	1887	1932	1976	44 1 4.4 2 8.8 3 13.2 4 17.6 5 22.0 6 26.4 7 30.8 8 35.2 9 39.6
32	2021	2066	2110	2155̅	2200	2244	2289	2333	2378	2423	
33	2467	2512	2556	2601	2646	2690	2735̅	2780	2824	2869	
34	2913	2958	3003	3047	3092	3136	3181	3226	3270	3315̅	
35	3360	3404	3449	3493	3538	3583	3627	3672	3716	3761	
36	3806	3850	3895̅	3939	3984	4029	4073	4118	4162	4207	
37	4252	4296	4341	4386	4430	4475̅	4519	4564	4609	4653	
38	4698	4742	4787	4831	4876	4921	4965	5010	5054	5099	
39	5144	5188	5233	5277	5322	5367	5411	5456	5500	5545̅	
9740	5590	5634	5679	5723	5768	5813	5857	5902	5946	5991	
41	6035	6080	6125̅	6169	6214	6258	6303	6348	6392	6437	
42	6481	6526	6570	6615̅	6660	6704	6749	6793	6838	6882	
43	6927	6972	7016	7061	7105	7150	7194	7239	7284	7328	
44	7373	7417	7462	7506	7551	7596	7640	7685̅	7729	7774	
45	7818	7863	7908	7952	7997	8041	8086	8130	8175̅	8220	
46	8264	8309	8353	8398	8442	8487	8531	8576	8621	8665	
47	8710	8754	8799	8843	8888	8932	8977	9022	9066	9111	
48	9155	9200	9244	9289	9333	9378	9423	9467	9512	9556	
49	9601	9645	9690	9734	9779	9823	9868	9913	9957	0̅002	
9750	989 0046	0091	0135	0180	0224	0269	0313	0358	0402	0447	
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9750 — 9800

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52	0937	0981	1026	1071	1115	1160	1204	1249	1293	1338	
53	1382	1427	1471	1516	1560	1605̄	1649	1694	1738	1783	
54	1828	1872	1917	1961	2006	2050	2095̄	2139	2184	2228	
55	2273	2317	2362	2406	2451	2495	2540	2584	2629	2673	
56	2718	2762	2807	2851	2896	2940	2985	3030	3074	3119	
57	3163	3208	3252	3297	3341	3386	3430	3475̄	3519	3564	
58	3608	3653	3697	3742	3786	3831	3875	3920	3964	4009	
59	4053	4098	4142	4187	4231	4276	4320	4365̄	4409	4454	
9760	4498	4543	4587	4632	4676	4721	4765	4810	4854	4899	
61	4943	4988	5032	5077	5121	5166	5210	5255̄	5299	5344	45
62	5388	5433	5477	5521	5566	5610	5655̄	5699	5744	5788	1 4.5
63	5833	5877	5922	5966	6011	6055	6100	6144	6189	6233	2 9.0
64	6278	6322	6367	6411	6456	6500	6545̄	6589	6634	6678	3 13.5
65	6722	6767	6811	6856	6900	6945̄	6989	7034	7078	7123	4 18.0
66	7167	7212	7256	7301	7345	7390	7434	7478	7523	7567	5 22.5
67	7612	7656	7701	7745	7790	7834	7879	7923	7968	8012	6 27.0
68	8057	8101	8145	8190	8234	8279	8323	8368	8412	8457	7 31.5
69	8501	8546	8590	8634	8679	8723	8768	8812	8857	8901	8 36.0
9770	8946	8990	9035̄	9079	9123	9168	9212	9257	9301	9346	9 40.5
71	9390	9435̄	9479	9523	9568	9612	9657	9701	9746	9790	
72	9835̄	9879	9923	9968	0̄012	0̄057	0̄101	0̄146	0̄190	0̄235̄	
73	990 0279	0323	0368	0412	0457	0501	0546	0590	0634	0679	
74	0723	0768	0812	0857	0901	0946	0990	1034	1079	1123	
75	1168	1212	1257	1301	1345	1390	1434	1479	1523	1568	
76	1612	1656	1701	1745	1790	1834	1878	1923	1967	2012	
77	2056	2101	2145̄	2189	2234	2278	2323	2367	2411	2456	
78	2500	2545̄	2589	2634	2678	2722	2767	2811	2856	2900	
79	2944	2989	3033	3078	3122	3167	3211	3255	3300	3344	
9780	3389	3433	3477	3522	3566	3611	3655̄	3699	3744	3788	
81	3833	3877	3921	3966	4010	4055̄	4099	4143	4188	4232	44
82	4277	4321	4365	4410	4454	4499	4543	4587	4632	4676	1 4.4
83	4721	4765̄	4809	4854	4898	4942	4987	5031	5076	5120	2 8.8
84	5164	5209	5253	5298	5342	5386	5431	5475	5520	5564	3 13.2
85	5608	5653	5697	5741	5786	5830	5875̄	5919	5963	6008	4 17.6
86	6052	6096	6141	6185	6230	6274	6318	6363	6407	6452	5 22.0
87	6496	6540	6585̄	6629	6673	6718	6762	6806	6851	6895	6 26.4
88	6940	6984	7028	7073	7117	7161	7206	7250	7295̄	7339	7 30.8
89	7383	7428	7472	7516	7561	7605	7649	7694	7738	7783	8 35.2
9790	7827	7871	7916	7960	8004	8049	8093	8137	8182	8226	9 39.6
91	8271	8315̄	8359	8404	8448	8492	8537	8581	8625	8670	
92	8714	8758	8803	8847	8891	8936	8980	9025̄	9069	9113	
93	9158	9202	9246	9291	9335̄	9379	9424	9468	9512	9557	
94	9601	9645	9690	9734	9778	9823	9867	9911	9956	0̄000	
95	991 0044	0089	0133	0177	0222	0266	0310	0355̄	0399	0443	
96	0488	0532	0576	0621	0665	0709	0754	0798	0842	0887	
97	0931	0975	1020	1064	1108	1153	1197	1241	1286	1330	
98	1374	1419	1463	1507	1552	1596	1640	1685̄	1729	1773	
99	1818	1862	1906	1951	1995̄	2039	2083	2128	2172	2216	
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9800	991 2261	2305	2349	2394	2438	2482	2527	2571	2615	2660	
01	2704	2748	2793	2837	2881	2925	2970	3014	3058	3103	
02	3147	3191	3236	3280	3324	3369	3413	3457	3501	3546	
03	3590	3634	3679	3723	3767	3812	3856	3900	3944	3989	
04	4033	4077	4122	4166	4210	4255̄	4299	4343	4387	4432	
05	4476	4520	4565̄	4609	4653	4697	4742	4786	4830	4875̄	
06	4919	4963	5007	5052	5096	5140	5185̄	5229	5273	5317	
07	5362	5406	5450	5495̄	5539	5583	5627	5672	5716	5760	
08	5805̄	5849	5893	5937	5982	6026	6070	6115̄	6159	6203	
09	6247	6292	6336	6380	6424	6469	6513	6557	6602	6646	
9810	6690	6734	6779	6823	6867	6911	6956	7000	7044	7088	
11	7133	7177	7221	7266	7310	7354	7398	7443	7487	7531	45 1 4.5 2 9.0 3 13.5 4 18.0 5 22.5 6 27.0 7 31.5 8 36.0 9 40.5
12	7575	7620	7664	7708	7752	7797	7841	7885	7929	7974	
13	8018	8062	8107	8151	8195	8239	8284	8328	8372	8416	
14	8461	8505̄	8549	8593	8638	8682	8726	8770	8815̄	8859	
15	8903	8947	8992	9036	9080	9124	9169	9213	9257	9301	
16	9345	9390	9434	9478	9522	9567	9611	9655	9699	9744	
17	9788	9832	9876	9921	9965̄	0̄009	0̄053	0̄098	0̄142	0̄186	
18	992 0230	0275̄	0319	0363	0407	0451	0496	0540	0584	0628	
19	0673	0717	0761	0805	0850	0894	0938	0982	1026	1071	
9820	1115̄	1159	1203	1248	1292	1336	1380	1424	1469	1513	
21	1557	1601	1646	1690	1734	1778	1822	1867	1911	1955	
22	1999	2044	2088	2132	2176	2220	2265̄	2309	2353	2397	
23	2441	2486	2530	2574	2618	2662	2707	2751	2795	2839	
24	2884	2928	2972	3016	3060	3105̄	3149	3193	3237	3281	
25	3326	3370	3414	3458	3502	3547	3591	3635	3679	3723	
26	3768	3812	3856	3900	3944	3989	4033	4077	4121	4165	
27	4210	4254	4298	4342	4386	4431	4475̄	4519	4563	4607	
28	4651	4696	4740	4784	4828	4872	4917	4961	5005̄	5049	
29	5093	5138	5182	5226	5270	5314	5358	5403	5447	5491	
9830	5535	5579	5624	5668	5712	5756	5800	5844	5889	5933	
31	5977	6021	6065	6109	6154	6198	6242	6286	6330	6375̄	44 1 4.4 2 8.8 3 13.2 4 17.6 5 22.0 6 26.4 7 30.8 8 35.2 9 39.6
32	6419	6463	6507	6551	6595	6640	6684	6728	6772	6816	
33	6860	6905̄	6949	6993	7037	7081	7125	7170	7214	7258	
34	7302	7346	7390	7435̄	7479	7523	7567	7611	7655	7699	
35	7744	7788	7832	7876	7920	7964	8009	8053	8097	8141	
36	8185	8229	8274	8318	8362	8406	8450	8494	8538	8583	
37	8627	8671	8715	8759	8803	8847	8892	8936	8980	9024	
38	9068	9112	9156	9201	9245̄	9289	9333	9377	9421	9465	
39	9510	9554	9598	9642	9686	9730	9774	9819	9863	9907	
9840	9951	9995	0̄039	0̄083	0̄128	0̄172	0̄216	0̄260	0̄304	0̄348	
41	993 0392	0436	0481	0525̄	0569	0613	0657	0701	0745	0789	
42	0834	0878	0922	0966	1010	1054	1098	1142	1187	1231	
43	1275̄	1319	1363	1407	1451	1495	1540	1584	1628	1672	
44	1716	1760	1804	1848	1893	1937	1981	2025̄	2069	2113	
45	2157	2201	2245	2290	2334	2378	2422	2466	2510	2554	
46	2598	2642	2687	2731	2775̄	2819	2863	2907	2951	2995	
47	3039	3083	3128	3172	3216	3260	3304	3348	3392	3436	
48	3480	3524	3569	3613	3657	3701	3745̄	3789	3833	3877	
49	3921	3965	4010	4054	4098	4142	4186	4230	4274	4318	
9850	4362	4406	4450	4495̄	4539	4583	4627	4671	4715	4759	
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9850	993 4362	4406	4450	4495̄	4539	4583	4627	4671	4715	4759
51	4803	4847	4891	4935	4980	5024	5068	5112	5156	5200
52	5244	5288	5332	5376	5420	5464	5509	5553	5597	5641
53	5685̄	5729	5773	5817	5861	5905	5949	5993	6037	6082
54	6126	6170	6214	6258	6302	6346	6390	6434	6478	6522
55	6566	6610	6654	6698	6743	6787	6831	6875̄	6919	6963
56	7007	7051	7095	7139	7183	7227	7271	7315	7359	7404
57	7448	7492	7536	7580	7624	7668	7712	7756	7800	7844
58	7888	7932	7976	8020	8064	8108	8152	8197	8241	8285̄
59	8329	8373	8417	8461	8505̄	8549	8593	8637	8681	8725
9860	8769	8813	8857	8901	8945	8989	9033	9077	9122	9166
61	9210	9254	9298	9342	9386	9430	9474	9518	9562	9606
62	9650	9694	9738	9782	9826	9870	9914	9958	0̄002	0̄046
63	994 0090	0134	0178	0222	0266	0310	0355̄	0399	0443	0487
64	0531	0575̄	0619	0663	0707	0751	0795̄	0839	0883	0927
65	0971	1015̄	1059	1103	1147	1191	1235	1279	1323	1367
66	1411	1455	1499	1543	1587	1631	1675	1719	1763	1807
67	1851	1895	1939	1983	2027	2071	2115	2159	2203	2247
68	2291	2335	2379	2423	2467	2511	2555	2599	2643	2687
69	2731	2775	2820	2864	2908	2952	2996	3040	3084	3128
9870	3172	3216	3260	3304	3348	3392	3436	3480	3524	3568
71	3612	3656	3700	3744	3788	3831	3875	3919	3963	4007
72	4051	4095	4139	4183	4227	4271	4315	4359	4403	4447
73	4491	4535	4579	4623	4667	4711	4755	4799	4843	4887
74	4931	4975	5019	5063	5107	5151	5195	5239	5283	5327
75	5371	5415	5459	5503	5547	5591	5635̄	5679	5723	5767
76	5811	5855̄	5899	5943	5987	6031	6075̄	6119	6163	6207
77	6251	6295̄	6338	6382	6426	6470	6514	6558	6602	6646
78	6690	6734	6778	6822	6866	6910	6954	6998	7042	7086
79	7130	7174	7218	7262	7306	7350	7394	7438	7482	7525
9880	7569	7613	7657	7701	7745	7789	7833	7877	7921	7965
81	8009	8053	8097	8141	8185̄	8229	8273	8317	8361	8405̄
82	8448	8492	8536	8580	8624	8668	8712	8756	8800	8844
83	8888	8932	8976	9020	9064	9108	9152	9196	9239	9283
84	9327	9371	9415	9459	9503	9547	9591	9635̄	9679	9723
85	9767	9811	9855̄	9899	9942	9986	0̄030	0̄074	0̄118	0̄162
86	995 0206	0250	0294	0338	0382	0426	0470	0514	0557	0601
87	0645	0689	0733	0777	0821	0865̄	0909	0953	0997	1041
88	1085̄	1128	1172	1216	1260	1304	1348	1392	1436	1480
89	1524	1568	1612	1656	1699	1743	1787	1831	1875	1919
9890	1963	2007	2051	2095̄	2139	2182	2226	2270	2314	2358
91	2402	2446	2490	2534	2578	2622	2665	2709	2753	2797
92	2841	2885̄	2929	2973	3017	3061	3104	3148	3192	3236
93	3280	3324	3368	3412	3456	3500	3543	3587	3631	3675
94	3719	3763	3807	3851	3895̄	3939	3982	4026	4070	4114
95	4158	4202	4246	4290	4334	4377	4421	4465	4509	4553
96	4597	4641	4685̄	4729	4772	4816	4860	4904	4948	4992
97	5036	5080	5123	5167	5211	5255	5299	5343	5387	5431
98	5474	5518	5562	5606	5650	5694	5738	5782	5825	5869
99	5913	5957	6001	6045̄	6089	6133	6176	6220	6264	6308
9900	6352	6396	6440	6484	6527	6571	6615	6659	6703	6747
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P. P.

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7	30.8
8	35.2
9	39.6

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3	12.9
4	17.2
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6	25.8
7	30.1
8	34.4
9	38.7

P. P.

N.	0	1	2	3	4	5	6	7	8	9
9900	995 6352	6396	6440	6484	6527	6571	6615	6659	6703	6747
01	6791	6834	6878	6922	6966	7010	7054	7098	7142	7185
02	7229	7273	7317	7361	7405̄	7449	7492	7536	7580	7624
03	7668	7712	7755	7799	7843	7887	7931	7975̄	8019	8062
04	8106	8150	8194	8238	8282	8326	8369	8413	8457	8501
05	8545̄	8589	8632	8676	8720	8764	8808	8852	8896	8939
06	8983	9027	9071	9115̄	9159	9202	9246	9290	9334	9378
07	9422	9465	9509	9553	9597	9641	9685̄	9728	9772	9816
08	9860	9904	9948	9991	0̄035	0̄079	0̄123	0̄167	0̄211	0̄254
09	996 0298	0342	0386	0430	0474	0517	0561	0605	0649	0693
9910	0737	0780	0824	0868	0912	0956	0999	1043	1087	1131
11	1175̄	1219	1262	1306	1350	1394	1438	1481	1525	1569
12	1613	1657	1701	1744	1788	1832	1876	1920	1963	2007
13	2051	2095̄	2139	2182	2226	2270	2314	2358	2402	2445
14	2489	2533	2577	2621	2664	2708	2752	2796	2840	2883
15	2927	2971	3015̄	3059	3102	3146	3190	3234	3278	3321
16	3365	3409	3453	3497	3540	3584	3628	3672	3716	3759
17	3803	3847	3891	3935̄	3978	4022	4066	4110	4153	4197
18	4241	4285̄	4329	4372	4416	4460	4504	4548	4591	4635
19	4679	4723	4766	4810	4854	4898	4942	4985	5029	5073
9920	5117	5161	5204	5248	5292	5336	5379	5423	5467	5511
21	5554	5598	5642	5686	5730	5773	5817	5861	5905̄	5948
22	5992	6036	6080	6124	6167	6211	6255̄	6299	6342	6386
23	6430	6474	6517	6561	6605̄	6649	6693	6736	6780	6824
24	6868	6911	6955	6999	7043	7086	7130	7174	7218	7261
25	7305	7349	7393	7436	7480	7524	7568	7611	7655	7699
26	7743	7786	7830	7874	7918	7961	8005	8049	8093	8136
27	8180	8224	8268	8311	8355	8399	8443	8486	8530	8574
28	8618	8661	8705	8749	8793	8836	8880	8924	8968	9011
29	9055	9099	9143	9186	9230	9274	9318	9361	9405	9449
9930	9492	9536	9580	9624	9667	9711	9755̄	9799	9842	9886
31	9930	9974	0̄017	0̄061	0̄105̄	0̄148	0̄192	0̄236	0̄280	0̄323
32	997 0367	0411	0455̄	0498	0542	0586	0629	0673	0717	0761
33	0804	0848	0892	0936	0979	1023	1067	1110	1154	1198
34	1242	1285	1329	1373	1416	1460	1504	1548	1591	1635
35	1679	1722	1766	1810	1854	1897	1941	1985̄	2028	2072
36	2116	2160	2203	2247	2291	2334	2378	2422	2465	2509
37	2553	2597	2640	2684	2728	2771	2815	2859	2903	2946
38	2990	3034	3077	3121	3165̄	3208	3252	3296	3340	3383
39	3427	3471	3514	3558	3602	3645	3689	3733	3776	3820
9940	3864	3908	3951	3995̄	4039	4082	4126	4170	4213	4257
41	4301	4344	4388	4432	4475	4519	4563	4607	4650	4694
42	4738	4781	4825̄	4869	4912	4956	5000	5043	5087	5131
43	5174	5218	5262	5305	5349	5393	5436	5480	5524	5567
44	5611	5655̄	5699	5742	5786	5830	5873	5917	5961	6004
45	6048	6092	6135	6179	6223	6266	6310	6354	6397	6441
46	6485̄	6528	6572	6616	6659	6703	6747	6790	6834	6878
47	6921	6965̄	7009	7052	7096	7139	7183	7227	7270	7314
48	7358	7401	7445	7489	7532	7576	7620	7663	7707	7751
49	7794	7838	7882	7925	7969	8013	8056	8100	8144	8187
9950	8231	8274	8318	8362	8405	8449	8493	8536	8580	8624
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P. P.

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P. P.

N.	0	1	2	3	4	5	6	7	8	9	P. P.
9950	997 8231	8274	8318	8362	8405	8449	8493	8536	8580	8624	
51	8667	8711	875̄5̄	8798	8842	8885	8929	8973	9016	9060	
52	9104	9147	9191	923̄5̄	9278	9322	9365	9409	9453	9496	
53	9540	9584	9627	9671	9715̄	9758	9802	9845	9889	9933	
54	9976	0̄020	0̄064	0̄107	0̄151	0̄195̄	0̄238	0̄282	0̄325	0̄369	
55	998 0413	0456	0500	0544	0587	0631	0674	0718	0762	0805	
56	0849	0893	0936	0980	1023	1067	1111	1154	1198	1241	
57	1285	1329	1372	1416	1460	1503	1547	1590	1634	1678	
58	1721	1765̄	1808	1852	1896	1939	1983	2026	2070	2114	
59	2157	2201	2245̄	2288	2332	2375	2419	2463	2506	2550	
9960	2593	2637	2681	2724	2768	2811	2855̄	2899	2942	2986	
61	3029	3073	3117	3160	3204	3247	3291	3335̄	3378	3422	44 1 4.4 2 8.8 3 13.2 4 17.6 5 22.0 6 26.4 7 30.8 8 35.2 9 39.6
62	3465	3509	3553	3596	3640	3683	3727	3771	3814	3858	
63	3901	3945̄	3988	4032	4076	4119	4163	4206	4250	4294	
64	4337	4381	4424	4468	4512	4555	4599	4642	4686	4729	
65	4773	4817	4860	4904	4947	4991	5035̄	5078	5122	5165	
66	5209	5252	5296	5340	5383	5427	5470	5514	5557	5601	
67	5645̄	5688	5732	5775	5819	5862	5906	5950	5993	6037	
68	6080	6124	6167	6211	6255̄	6298	6342	6385	6429	6472	
69	6516	6560	6603	6647	6690	6734	6777	6821	6864	6908	
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71	7387	7431	7474	7518	7561	7605̄	7648	7692	7736	7779	
72	7823	7866	7910	7953	7997	8040	8084	8128	8171	8215̄	
73	8258	8302	8345	8389	8432	8476	8519	8563	8607	8650	
74	8694	8737	8781	8824	8868	8911	8955̄	8998	9042	9086	
75	9129	9173	9216	9260	9303	9347	9390	9434	9477	9521	
76	9564	9608	9651	9695	9739	9782	9826	9869	9913	9956	
77	999 0000	0043	0087	0130	0174	0217	0261	0304	0348	0391	
78	0435̄	0479	0522	0566	0609	0653	0696	0740	0783	0827	
79	0870	0914	0957	1001	1044	1088	1131	1175̄	1218	1262	
9980	1305	1349	1392	1436	1479	1523	1567	1610	1654	1697	
81	1741	1784	1828	1871	1915̄	1958	2002	2045	2089	2132	43 1 4.3 2 8.6 3 12.9 4 17.2 5 21.5 6 25.8 7 30.1 8 34.4 9 38.7
82	2176	2219	2263	2306	2350	2393	2437	2480	2524	2567	
83	2611	2654	2698	2741	2785̄	2828	2872	2915	2959	3002	
84	3046	3089	3133	3176	3220	3263	3307	3350	3394	3437	
85	3481	3524	3568	3611	3655̄	3698	3742	3785	3829	3872	
86	3916	3959	4003	4046	4090	4133	4177	4220	4264	4307	
87	4350	4394	4437	4481	4524	4568	4611	4655̄	4698	4742	
88	4785	4829	4872	4916	4959	5003	5046	5090	5133	5177	
89	5220	5264	5307	5351	5394	5438	5481	5524	5568	5611	
9990	5655̄	5698	5742	5785	5829	5872	5916	5959	6003	6046	
91	6090	6133	6177	6220	6263	6307	6350	6394	6437	6481	
92	6524	6568	6611	6655̄	6698	6742	6785	6828	6872	6915	
93	6959	7002	7046	7089	7133	7176	7220	7263	7307	7350	
94	7393	7437	7480	7524	7567	7611	7654	7698	7741	7785̄	
95	7828	7871	7915̄	7958	8002	8045	8089	8132	8176	8219	
96	8262	8306	8349	8393	8436	8480	8523	8567	8610	8653	
97	8697	8740	8784	8827	8871	8914	8958	9001	9044	9088	
98	9131	9175̄	9218	9262	9305	9349	9392	9435	9479	9522	
99	9566	9609	9653	9696	9739	9783	9826	9870	9913	9957	
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N.	0	1	2	3	4	5	6	7	8	9	P. P.